CONFIDENTIAL FINANCIAL INFORMATION TO BE WITHHELD FROM PUBLIC DISCLOSURE PURSUANT TO 10 CFR 2.390 & 10 CFR 9.17

TMI-2 SOLUTIONS

March 17, 2021
TMI2-RA-COR-2021-0004

10 CFR 50.51
10 CFR 50.82(a)(7)

U.S. Nuclear Regulatory Commission
ATTN; Document Control Desk
Washington, DC 20555-0001

Subject: Notification of "Amended Post-Shutdown Decommissioning Activities Report" (PSDAR) for Three Mile Island, Unit 2 in Accordance with 10 CFR 50.82(a)(7), Revision 4

Three Mile Island, Unit 2
NRC Possession Only License No. DPR-73
NRC Docket No. 50-320

References:

1) Letter TMI-19-112 from Halnon, G.H. (GPU Nuclear, Inc.), and Sauger J. (TMI-2 Solutions LLC), "Application for Order Approving License Transfer and Conforming License Amendments," (ML19325C600) dated November 12, 2019.

2) Letter from USNRC to Sauger, J. (TMI-2 Solutions, LLC), "Three Mile Island Nuclear Station, Unit No. 2 – Issuance of Amendment No. 64 Re: Order Approving Transfer of License and Conforming License Amendment (EPID L-2019-LLA-0257)," (ML20352A381) dated December 18, 2020.

GPU Nuclear, Metropolitan Edison Company, Jersey Central Power & Light Company, Pennsylvania Electric Company, and TMI-2 Solutions, LLC, submitted an "Application for Order Approving License Transfer and Conforming License Amendments" for Three Mile Island Unit-2 (TMI-2) to the U. S. Nuclear Regulatory Commission (NRC) for review in a letter dated November 12, 2019 (Reference 1) (the Application). The license application was approved by the NRC in Reference 2. TMI-2 Solutions became the TMI-2 licensee on December 18, 2020, following the closing of the transaction specified in the October 15, 2019 Asset Purchase and Sale Agreement ("The Closing") among the Applicants ("Purchase Agreement") enclosed with the Application (Reference 1).

A001
NRR

UPON REMOVAL OF ENCLOSURE 1A THIS DOCUMENT IS UNCONTROLLED.

This letter submits TMI-2 Post-Shutdown Decommissioning Activities Report (PSDAR) Revision 4 to the NRC (Attachment 1). TMI-2 Solutions has developed this PSDAR for TMI-2 in accordance with the requirements of 10 CFR 50.82, "Termination of license," paragraph (a)(4)(i).

Attachment 1, Enclosure 1A contains confidential commercial and financial information. TMI-2 Solutions requests that the information provided in Enclosure 1A be withheld from public disclosure pursuant to 10 CFR 2.390, as described in the Affidavit provided in Attachment 2. A redacted version of Enclosure 1A, suitable for public disclosure, is provided as Enclosure 1B.

In accordance with 10 CFR 50.91(b)(1), a copy of this submittal has been sent to the Commonwealth of Pennsylvania.

This document contains regulatory commitments as noted in Attachment 3.

In the event that the NRC has any questions with respect to the content of this document or wishes to obtain any additional information, please contact me at 860-462-9707.

Sincerely

Gerard van Noordennen

Gerard van Noordennen
Senior Vice President Regulatory Affairs
TMI Solutions, LLC

Attachments:

Attachment 1 – Three Mile Island Nuclear Power Station, Unit 2 Post-Shutdown Decommissioning Activities Report, Revision 4 (with Enclosures)

Attachment 2 – 10 CFR 2.390 Affidavit

Attachment 3 – List of Regulatory Commitments

Attachment 4 – Correspondence with Pennsylvania State Historic Preservation Office

cc w/Proprietary Enclosures:

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NRC Region I Administrator
NRC Lead Inspector

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ATTACHMENT 2 TO TMI2-RA-COR-2021-0004

10 CFR 2.390 AFFIDAVIT

THREE MILE ISLAND NUCLEAR POWER STATION, UNIT 2

NRC POSSESSION ONLY LICENSE NO. DPR-73

TMI-2 Solutions Proprietary Information Affidavit

Affidavit of Gerard van Noordennen, Senior Vice President Regulatory Affairs, TMI-2 Solutions, LLC.

TMI-2 Solutions, LLC, is providing information in support of the TMI-2 "Post-Shutdown Decommissioning Activity Report" Revision 4, described in this letter. Attachment 1 Enclosure 1A contains financial information, including proprietary aspects to the decommissioning of TMI-2, which constitute proprietary commercial and financial information, belonging to TMI-2 Solutions, that should be held in confidence by the NRC pursuant to the policy reflected in 10 CFR 2.390 and 10 CFR 9.17. Release of this information would cause irreparable harm to the competitive position of TMI-2 Solutions, LLC. This basis for this declaration is:

I. This information is owned and maintained as proprietary by TMI-2 Solutions, LLC,

II. This information is routinely held in confidence by TMI-2 Solutions, LLC, and not disclosed to the public,

III. This information is being requested to be held in confidence by the NRC by this petition,

IV. This information is not available in public sources,

V. This information would cause substantial harm to TMI-2 Solutions, LLC, if it were released publicly, and

VI. The information to be withheld was transmitted to the NRC in confidence.

I, Gerard van Noordennen, being duly sworn, state that I am the person who subscribes my name to the foregoing statement, I am authorized to execute the Affidavit on behalf of TMI-2 Solutions, LLC, and that the matters and facts set forth in the statement are true to the best of my knowledge, information, and belief.

Gerard van Noordennen

Gerard van Noordennen
Senior Vice President Regulatory Affairs
TMI-2 Solutions, LLC

Sworn To And Subscribed Before Me This 17 Day of March, 2021

My Commission Expires February 28, 2023

Jo-Ann Lewis

JO-ANN LEWIS
NOTARY PUBLIC
MY COMMISSION EXPIRES FEB. 28, 2023

ATTACHMENT 1 TO LETTER NUMBER TMI2-RA-COR-2021-0004

THREE MILE ISLAND NUCLEAR POWER STATION, UNIT 2
POST-SHUTDOWN DECOMMISSIONING ACTIVITIES REPORT (PSDAR)
REVISION 4

THREE MILE ISLAND NUCLEAR POWER STATION, UNIT 2

NRC POSSESSION ONLY LICENSE NO. DPR-73

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ENCLOSURES

REVISION HISTORY

Revision Number	Revision Description
0	Initial Issue (June 2013).
1	Incorporated information to update Table 1 to 2012 dollars (November 2013) Changes are on Pages 1, 2, 14, and 15.
2	Incorporated information resulting from 2014 Decommissioning Cost Analysis, revised information on the post-defueling monitored storage agreement, and incorporated various administrative clarifications. (December 2015) Changes are on Pages 1, 2, 5 through 15, and 25.
3	Revised section I "Introduction" with general information pertaining to transfer of ownership of TMI-2 and accelerated decommissioning. Revised section II "Background" to include information that addresses transfer of Possession Only License No. DPR-73 from FirstEnergy to TMI-2 Solutions; Revised section III "Description of Decommissioning Activities" to address activities following license transfer to TMI-2 Solutions, updated the project organization, and replaced decommissioning "periods" with decommissioning "phases." Revised section IV "Schedule of Decommissioning Activities," and section V "Estimated Cost of Decommissioning Activities," with updated detailed schedule and decommissioning cost information. Changes are on pages throughout.
4	Revised to reflect transfer of license from GPUN to TMI-2 Solutions and transition of TMI-2 from its PDMS state to DECON. Updated Section III to provide a description of decommissioning activities. Updated Section VI "Environmental Impacts" to present the results of the evaluation of potential environmental impacts upon TMI-2. Changes are on pages throughout therefore revision bars are not included.

1. INTRODUCTION

GPU Nuclear, Metropolitan Edison Company, Jersey Central Power & Light Company, Pennsylvania Electric Company, and TMI-2 Solutions, LLC, submitted an "Application for Order Approving License Transfer and Conforming License Amendments" for TMI-2 to the NRC for review in a letter dated November 12, 2019 (Reference 1). TMI-2 Solutions requested that the Order authorize the license transfer to take place at any time up to one year after date of issuance. The license transfer application was approved by the NRC in Reference 2. TMI-2 Solutions became the TMI-2 licensee on December 18, 2020, following the closing of the transaction specified in the October 15, 2019 Asset Purchase and Sale Agreement among the Applicants (the "Closing"). TMI-2 Solutions maintains responsibility for all licensed activities at the TMI-2 site, including responsibility under the License to complete radiological decommissioning pursuant to NRC regulations. TMI-2 Solutions has developed this Post-Shutdown Decommissioning Activities Report (PSDAR) for TMI-2 in accordance with the requirements of 10 CFR 50.82, "Termination of license," paragraph (a)(4)(i).

The TMI-2 Possession Only License No. DPR-73 (POL) ("License") is currently maintained by TMI-2 Solutions in accordance with the NRC approved SAFSTOR condition (a method in which a nuclear facility is placed and maintained in a condition that allows it to be safely stored and subsequently decontaminated) known as Post-Defueling Monitored Storage (PDMS). GPU Nuclear has maintained TMI-2 in the PDMS state since the NRC provisions for cleanup were met on December 28, 1993. This revision of the PSDAR has been prepared to reflect the transition of the TMI-2 facilities from PDMS to DECON (a facility undergoing decommissioning).

By letter dated August 14, 2012, (Reference 3) GPU Nuclear informed the NRC of the status of TMI-2 relative to the 1996 decommissioning rule changes in 10 CFR 50.51, "Continuation of license," and 10 CFR 50.82, "Termination of license." The letter stated the intent to submit a PSDAR that describes the planned decommissioning activities, schedule, cost estimates, and the environmental impacts of the TMI-2 facility decommissioning. In a letter dated February 13, 2013, (Reference 4) the NRC stated that September 14, 1993 is considered the date of TMI-2's cessation of operations. The September 14, 1993 date coincides with the issuance of amendment 45, which converted the TMI-2 operating license into a POL (Reference 5).

The PSDAR is provided in accordance with the requirements of 10 CFR 50.82 and has been developed utilizing the applicable guidance of Regulatory Guide 1.185 "Standard Format And Content For Post-Shutdown Decommissioning Activities Report," Revision 1.

2. BACKGROUND

TMI-2 is located on the northern-most section of Three Mile Island near the east shore of the Susquehanna River in Dauphin County, Pennsylvania. The station is comprised of two pressurized water reactors. The TMI Nuclear Station includes Unit 1, owned by Exelon Generation Company, LLC (Exelon), which has permanently ceased power operations and consistent with 10 CFR 50.82(a)(ii) removed the fuel from the reactor vessel, and the shutdown and defueled Unit 2 owned by TMI-2 Solutions.

TMI-2 is a non-operational pressurized water reactor that was rated at a core thermal power level of 2772 megawatt-thermal with a corresponding turbine-generator gross output of 959 megawatt-electric. TMI-2 employed a two loop pressurized water reactor nuclear steam supply system designed by Babcock and Wilcox Corporation. The reactor coolant system is housed within a steel-lined, post-tensioned concrete structure (reactor building), in the shape of a right, vertical cylinder with a hemispherical dome and a flat, reinforced concrete basemat. A welded steel liner plate, anchored to the inside face of the reactor building, serves as a leak-tight membrane. The TMI-2 cooling towers are located at the southern end of Three Mile Island adjacent to the TMI-2 turbine building.

GPU Nuclear was issued an operating license for TMI-2 on February 8, 1978, with commercial operation declared on December 30, 1978. On March 28, 1979, the unit experienced an accident initiated by interruption of secondary feedwater flow. The lack of secondary feedwater resulted in the reduction of primary-to-secondary heat exchange that caused an increase in the reactor coolant temperature, creating a surge into the pressurizer, and an increase in system pressure. The pressure operated relief valve (PORV) opened to relieve the pressure but failed to close when the pressure decreased. The reactor coolant pumps were turned off and a core heat-up began as the reactor coolant system water inventory continued to decrease resulting in a reactor vessel water level below the top of the core. This led to a core heat up that caused fuel damage. The majority of the fuel material travelled down through the region of the southeastern assemblies and into the core bypass region. A portion of the fuel material passed around the bypass region and migrated down into the lower internals and lower head region, but overall reactor vessel integrity was maintained throughout the accident.

As a result of this accident, small quantities of spent nuclear fuel, damaged core material, and high level waste (collectively referred to as "Debris Material") were transported through the reactor coolant system and the reactor building. In addition, a small quantity of Debris Material was transported to the auxiliary and fuel handling buildings (AFHB). Further spread of the debris also occurred as part of the post-accident water processing cleanup activities.

The quantity of fuel remaining at TMI-2 is a small fraction of the initial fuel load; approximately 99 percent (%) was successfully removed in the defueling. Additionally, large quantities of radioactive fission products that were released into various systems and structures were removed as part of the waste processing activities during the TMI-2

Cleanup Program. The cleanup to meet the NRC post-accident safe storage criteria was completed and accepted by the NRC with TMI-2 entering into PDMS in December 1993.

NUREG-0683, the Programmatic Environmental Impact Statement (PEIS) and its three Supplements (References 6, 7, 8, and 9) provide an overall evaluation of the environmental impacts that could result from decontamination and disposition of radioactive wastes beginning from when plant conditions were stabilized after the accident and continuing through completion of the cleanup from the accident. A discussion of the PEIS relative to TMI-2 environmental impacts is presented in Section 6 "Environmental Impacts of Decommissioning Activities."

Approximately 99% of the fuel was removed and shipped to the Idaho National Engineering and Environmental Laboratory (INEEL) under the responsibility of the U.S. Department of Energy (DOE). The reactor coolant system was decontaminated to the extent practical to reduce radiation levels to as low as is reasonably achievable (ALARA). As part of the decontamination effort, water was removed to the extent practical from the reactor coolant system and the fuel transfer canal, and the fuel transfer tubes were isolated. Radioactive wastes from the major clean-up activities have been shipped off-site or has been packaged and staged for shipment off-site.

Following the decontamination activities, only the reactor building and a few areas in the auxiliary and fuel handling buildings continued to have general area radiation levels higher than those of an undamaged reactor facility nearing the end of its operating life.

GPU Nuclear maintained TMI-2 in the PDMS state while successfully operating TMI-1 until AmerGen (a joint venture between Philadelphia Energy Company and British Energy) purchased the operating TMI-1 from GPU Nuclear in 1998. The sale of TMI-1 included the Unit 1 buildings, structures, and the majority of the site property; however, GPU Nuclear maintained ownership of TMI-2.

FirstEnergy acquired GPU Nuclear and ownership of TMI-2 in 2001 as part of a larger acquisition of GPU. In December 2003, Exelon Corp. acquired sole ownership of TMI-1. A monitoring agreement between GPU Nuclear and Exelon provides for Exelon performing certain functions at TMI-2, on behalf of GPU Nuclear, while TMI-2 is in PDMS. These functions include maintenance and testing, radiological and environmental controls, security and safety functions and licensing activities required by the PDMS Technical Specifications and PDMS Final Safety Analysis Report. In December 2020 TMI-2 Solutions acquired ownership of TMI-2, and with that the monitoring agreement between GPU Nuclear and Exelon is now between TMI-2 Solutions and Exelon.

A 2004 cost analysis for decommissioning TMI-2 assumed a delayed DECON scenario, which deferred the decontamination and dismantling (D&D) activities at TMI-2 until they are synchronized with TMI-1 such that the licenses for both units are terminated concurrently. This scenario assumed a 10-year dormancy period for TMI-2, following the TMI-1 original license expiration in 2014, with decommissioning preparation to begin in 2024. The initial schedule assumed decommissioning operations would begin in 2026

and would be completed over a 10-year period with site restoration projected in 2036. Since that time a 20-year extension to the TMI-1 operating license was granted by the NRC. This warranted a revision to the decommissioning cost analysis for TMI-2.

A 2014 cost analysis for TMI-2 evaluated a DECON scenario that assumes TMI-1 would commence decommissioning upon cessation of operations in 2034 and that the decommissioning programs for both units would run independently from each other. PSDAR revision 2, section IV "Schedule of Decommissioning Activities," established the schedule for the decommissioning of TMI-2 to commence following the expiration of the TMI-1 Operating License on April 19, 2034, with TMI-2 license termination occurring in 2053. However, with the approval of the application and transfer of the License to TMI-2 Solutions, TMI-2 Solutions will assume all authorities provided for and responsibilities under the License, including possession, maintenance, and eventual radiological decommissioning of TMI-2 and associated buildings and structures. Thereafter, following completion of all necessary engineering and licensing actions, TMI-2 Solutions will move into DECON with the goal to accelerate the decommissioning of TMI-2.

TMI-2 Solutions will commence decommissioning of TMI-2 and will complete all activities necessary to terminate the License and release the TMI-2 site years ahead of the plan reflected in revision 2 of the PSDAR which presumes license termination occurring in 2053. Revised decommissioning schedule information was provided to the NRC in PSDAR Revision 3 (Reference 10). TMI-2 Solutions anticipates completing decommissioning of TMI-2 and releasing the TMI-2 site (except for an area potentially to be set aside for storage of Debris Material on the Independent Spent Fuel Storage Installation (ISFSI)) approximately 16.5 years after the license transfer—seventeen years earlier than the current schedule. Refer to Enclosure 1A, Figure 1A-1 for a detailed TMI-2 decommissioning schedule. A redacted version of the schedule suitable for public release is available in Enclosure 1B, Figure 1B-1. The schedule begins with the date of license transfer and ends with the estimated date associated with completing Phase 2.

2.1 Summary of Decommissioning Alternatives

The NRC has evaluated the environmental impacts of three general methods for decommissioning power reactor facilities in NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities: Supplement 1, Volumes 1 and 2, Regarding the Decommissioning of Nuclear Power Reactors," (GEIS) (Reference 11). The three general methods evaluated are summarized as follows:

- DECON: The equipment, structures and portions of the facility and site that contain radioactive contaminants are promptly removed or decontaminated to a level that permits termination of the license shortly after cessation of operations.

- SAFSTOR: After the plant is shut down and defueled, the facility is placed in a safe, stable condition and maintained in that state (safe storage). The facility is decontaminated and dismantled at the end of the storage period to levels that

permit license termination. During SAFSTOR, a facility is left intact or may be partially dismantled, but the fuel is removed from the reactor vessel and radioactive liquids are drained from systems and components and then processed. Radioactive decay occurs during the SAFSTOR period, thereby reducing the quantity of contamination and radioactivity that must be disposed of during decontamination and dismantlement.

- ENTOMB: Radioactive structures, systems and components (SSCs) are encased in a structurally long-lived substance, such as concrete. The entombed structure is appropriately maintained, and continued surveillance is carried out until the radioactivity decays to a level that permits termination of the license.

The decommissioning approach that has been selected by TMI-2 Solutions is the DECON method. With the completion of the sale of TMI-2 to TMI-2 Solutions the plant will transition from the current PDMS state to DECON. The decommissioning strategy for the project is to initiate prompt decommissioning with a project goal of achieving unrestricted release of the TMI-2 site, except for the ISFSI.

3. DESCRIPTION OF DECOMMISSIONING ACTIVITIES

The objective of decommissioning TMI-2 is to safely perform all the activities associated with decontamination and dismantlement of the remaining plant SSC's and facilities in compliance with applicable federal, state and local rules and regulations.

The TMI-2 facility will remain in a PDMS condition prior to performing any major decommissioning activities[1]. The PDMS state was established following the accident to ensure an inherently stable and safe condition of the facility such that there was no risk to the public health and safety. The PDMS state has been approved by the NRC (Reference 5) and is governed by a PDMS Safety Analysis Report, PDMS Technical Specifications, and PDMS Quality Assurance Program.

The PDMS Technical Specification requirements to monitor and survey radiological conditions have been established and maintained since 1993. Site security is maintained as a contracted service by Exelon which owns and maintains the TMI-1 facility.

As discussed in the TMI-2 PDMS Safety Analysis Report:

- There is no credible possibility of nuclear criticality.

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[1] As defined in 10 CFR 50.2, "Definitions," a "major decommissioning activity" is "any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components for shipment containing greater than Class C waste in accordance with 10 CFR 61.55."

- Fuel and core debris removed from the reactor vessel and associated systems has been shipped offsite.

- Any potential for significant release of radioactivity has been eliminated.

- Water has been removed to the extent practical from the reactor coolant system and fuel transfer canal, and fuel transfer tubes have been isolated. The treatment and processing of accident generated water has been completed.

- Radioactive waste from the major cleanup activities has been shipped off-site or has been packaged for shipment off-site.

- Radiation within the facility has been reduced, as necessary, consistent with ALARA principles to levels that will allow necessary plant monitoring activities, the performance of required maintenance, and any necessary inspections.

TMI-2 Solutions holds title to and ownership of the TMI-2 power block; any TMI-2 improvements at the site; easements for other portions of the site; and any Debris Material, and high level waste within the TMI-2 facility. TMI-2 Solutions maintains responsibility for developing NRC compliant storage and disposal plans for any remaining Debris Material until title to the Debris Material is transferred to the DOE for disposal. Refer to Section 3.3.3 "Radioactive Waste Management" for a discussion related to disposal of low-level radioactive waste (LLRW). TMI-2 Solutions assumes responsibility for all licensed activities at the TMI-2 site, including responsibility under the license to complete radiological decommissioning pursuant to NRC regulations.

TMI-2 Solutions submitted a license amendment request (LAR) for NRC review (Reference 12) which proposes to remove or revise certain license conditions and technical specification (TS) requirements to reflect TMI-2 facility conditions during DECON. The changes proposed the elimination of those TS no longer applicable based on current plant radiological conditions and updated safe fuel mass limits (SFML). Upon issuance, this proposed amendment will modify the 10 CFR Part 50 License and the TS to support entry into DECON.

After taking the necessary engineering actions and upon receipt of NRC approval of the LAR (Reference 12) thereby allowing major decommissioning activities to proceed, TMI-2 Solutions will commence decommissioning of TMI-2 and will complete all activities necessary to terminate the license and release the TMI-2 site. TMI-2 Solutions intends to substantially complete decommissioning of TMI-2 and release the site by 2037, except for a potential area set aside for storage of Debris Material on the ISFSI.

Decommissioning activities will be performed in accordance with approved programs and associated implementing procedures as required. Radiological and environmental programs will be maintained throughout the decommissioning process to ensure

occupational, public health and safety, and environmental compliance with all applicable laws and regulations.

The decommissioning of TMI-2 has been divided into multiple phases as described below and presented in Table 3-1.

Phase 1 is comprised of Phase 1a and Phase 1b. The focus of Phase 1a is preparation for decommissioning which includes activities such as decommissioning planning, engineering and regulatory activities. The focus of Phase 1b is Debris Material recovery and source term reduction, which includes the recovery, packaging, and storage of Debris Material and the reduction of the overall radiological source term at TMI-2 and the TMI-2 Site to levels that are generally consistent with a nuclear plant toward the end of its operational life that has not experienced a core-damage accident.

Phase 2 includes the decommissioning and dismantlement of the TMI-2 site to a level that permits the release of the site, except for an area potentially to be set aside for storage of Debris Material on the ISFSI and the License Termination Plan (LTP) as well as site restoration activities.

Phase 3 refers to the management of the Debris Material on the ISFSI, activities associated with Phase 3 include providing security and maintenance for the ISFSI as well as decommissioning the ISFSI.

Major decommissioning activities will occur under Phase 1b and Phase 2.

Table 3-1 specifies the relationship between the Phases and the activities performed in each Phase. A description of the activities associated with each Phase is provided in the following sections.

Table 3-1
Phase Activities

Phase	Activities
Phase 1	Planning, Engineering, Remediation
Phase 1a	Preparation for Decommissioning
Phase 1b	Debris Material Recovery and Source Term Reduction
Phase 2	Typical Decommissioning and Dismantlement Site Remediation LTP and Site Restoration
Phase 3	Debris Material Management

3.1 Phase 1a Decommissioning Planning

While in Phase 1a, (which is estimated to last approximately two years) TMI-2 will remain in a PDMS state during which preparations for decommissioning will occur. Phase 1a includes planning, engineering, and regulatory activities.

3.1.1 Phase 1a Activities

The types of activities performed during Phase 1a include the following:

- Radiological and non-radiological characterization of the site and the surrounding environs.
- Identification of transport and disposal requirements for radioactive waste and hazardous waste.
- Development of program plans and procedures which governs the conduct of the decommissioning in areas such as Radiological Protection, Waste Management, Safety & Health, Environmental Management, Training, and QA.
- Design and fabrication of temporary shielding.
- Maintenance of contamination control envelopes.
- Procurement of specialty tooling and equipment.
- Procurement of radioactive waste shipping containers, specialized waste containers and boxes, casks, liners, and industrial packages for packaging.
- Shipment of radioactive liquid waste
- Removal of non-contaminated components/materials/structures
- Removal of non-installed LLRW materials
- ISFSI and Dry Cask Storage System (DCSS) design.
- Design, development, installation and maintenance of temporary facilities, or temporary modifications to existing facilities to support D&D activities such as:
    - Establishment of a temporary D&D electrical distribution system.
    - Establishment of a temporary material handling or packaging facility.
    - Repair and upgrade of the site infrastructure including roads, railroad spurs, bridges and facilities.
    - Design, and maintenance activities associated with restoration of cranes.
    - Establishment of a temporary liquid radioactive waste processing system.

- Establishment of temporary High Efficiency Particulate Air (HEPA) ventilation system(s) or maintenance of existing HEPA ventilation system(s).
- Design, development, installation and maintenance of an interim Integrated Decommissioning Support Facility (IDSF).

Preparation of Phase 1a activities will require coordination with Exelon, in accordance with the existing PDMS Service Agreement conditions.

3.1.2 Phase 1b: Debris Material Recovery and Source Term Reduction

Following Phase 1a TMI-2 will enter Phase 1b. The purpose of Phase 1b is to perform the activities associated with Debris Material recovery and source term reduction necessary to produce radiological conditions at TMI-2 that are generally consistent with a plant at the end of its useful life. Activities associated with Phase 1b can commence following NRC approval of the TMI-2 Solutions issued LAR (Reference 12) that revises the License by deleting the TS, Limiting Conditions for PDMS, and Surveillance Requirements, that are not applicable during decommissioning. Phase 1b will continue until remediation of the reactor building, and auxiliary and fuel handling building is complete, and Debris Material is packaged and stored on the ISFSI. Debris Material recovery and source term reduction activities that will be performed in Phase 1b include:

- Debris material recovery and source term reduction of the reactor coolant system including the reactor pressure vessel, steam generators, pressurizer, and piping.
- Decontamination of locked High Radiation Areas
- Removal and disposition of material necessary to minimize occupational dose to workers while maintaining As Low As Reasonably Achievable (ALARA) requirements.
- Removal of piping and components no longer essential to support decommissioning operations.
- Debris material recovery and source term reduction activities associated with the reactor building and reactor building basement, auxiliary building, and auxiliary fuel handling building.
- Recovery, packaging, and storage of the remaining Debris Material.
- Packaging and transportation of LLRW as required.
- ISFSI and DCSS related construction

Section 3.3.1 "Major Decommissioning Activities" discusses activities that will be performed in Phase 1b necessary to facilitate source term reduction and Debris Material removal.

The results of radiological surveys performed during Phase 1b will be used to determine which SSCs are removed as part of Phase 2 decommissioning. Similarly, ALARA considerations may provide the basis to perform removal of SSCs in Phase 1b.

3.2 Phase 2 Decommissioning

Phase 2 includes the decommissioning, license termination and site restoration activities described below. Phase 2 is expected to be completed in 2037.

At the commencement of Phase 2 decommissioning, the TMI-2 facility will generally be in a similar radiological condition as would a plant at the end of its operational life.

The overall goal of Phase 2 is decommissioning of the TMI-2 site to a level that permits the release of the site, except for an area potentially to be set aside for storage of Debris Material on the ISFSI. Decommissioning activities that will be performed in Phase 2 include:

- Removing, packaging, and disposing of any remaining radioactive components, structural elements, and equipment in preparation for structural demolition.
- Demolishing all plant structures to nominally three feet below grade.
- Backfilling the site to the existing grade elevation.

3.2.1 License Termination

Also included in Phase 2 is the preparation and execution of the License Termination Plan (LTP) and site restoration activities. The LTP will be prepared in accordance with the requirements of 10 CFR 50.82(a)(9) and will be prepared at least two years prior to the anticipated date of license termination. The LTP will include a site characterization, description of remaining dismantling activities, plans for site remediation, updated cost estimate to complete the decommissioning, any associated environmental impacts, designation of the end use of the site, and the procedures for the final radiation survey. The LTP will be developed following the guidance contained in Regulatory Guide 1.179, "Standard Format and Content of License Termination Plans for Nuclear Power Reactors." As described in Regulatory Guide 1.179 (Reference 13), the LTP will use the guidance contained in NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)" (Reference 14), to develop the final radiological survey plan and survey methods. The use of MARSSIM to develop the final radiological survey plan and survey methods will demonstrate compliance with the requirements 10 CFR 20, Subpart E, "Radiological Criteria for License Termination." Once the LTP is

approved, the final remediation of the site facilities and services can commence. These activities include, but are not limited to:

- Removal of remaining plant systems, structures and components as they become nonessential to the decommissioning program, or worker health and safety (for example, waste collection and processing systems, electrical power and ventilation systems).

- Removal of contaminated yard piping and any contaminated soil.

- Remediation and removal of the contaminated equipment and material from the reactor building and auxiliary fuel handling building, and any other contaminated facility.

Use of the NUREG-1575 guidance ensures that the surveys are conducted in a manner that provides a high degree of confidence that applicable NRC criteria are satisfied. Once the final survey is complete, the results are provided to the NRC. The NRC will terminate the license if it determines that site remediation has been performed in accordance with the LTP, and that the final status radiation survey and associated documentation demonstrate that the facility is suitable for release.

Phase 2 is expected to complete in 2037.

3.2.2 Site Restoration

After the NRC terminates the license, site restoration activities will be performed. TMI-2 Solutions currently assumes that remaining clean structures will be removed to a nominal depth of three feet below the surrounding grade level. Affected area(s) would then be backfilled with suitable fill materials, graded, and appropriate erosion controls established.

Non-contaminated concrete remaining after the demolition activities may be used for backfilling subsurface voids or may be transported to an offsite area for appropriate disposal as construction debris.

3.3 GENERAL DECOMMISSIONING CONSIDERATIONS

3.3.1 Major Decommissioning Activities

As defined in 10 CFR 50.2, "Definitions," a "major decommissioning activity" is "any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components for shipment containing greater than Class C waste in accordance with 10 CFR 61.55."

Major decommissioning activities will take place in Phase 1b and Phase 2. This includes the removal and disposal of contaminated and activated major components and

structures, leading to the termination of the 10 CFR Part 50 operating license. The following discussion provides a general summary of the major decommissioning activities currently planned for TMI-2.

Prior to starting a major decommissioning activity, the affected components will be surveyed and plans developed to maintain occupational dose As Low As Reasonably Achievable (ALARA) and below the occupational dose limits in 10 CFR Part 20 during decommissioning. Note the approaches described below may be altered for ALARA and/or cost efficiency purposes in accordance with the TMI-2 Radiological Protection Program.

The reconfiguration and modification of site structures and facilities will be performed to support decommissioning operations Modifications to the reactor building or other buildings to facilitate movement of equipment and materials, support the segmentation of the reactor vessel and reactor vessel internals, and for large component removal are described below.

A reactor building waste transfer corridor will be established. The waste transfer corridor will require construction of a new opening in the RB basement. The waste transfer corridor connects the RB basement to the turbine building. The waste transfer corridor will allow movement of demolition equipment and waste to and from the reactor building. The waste transfer corridor will involve structural modifications to the reactor building containment wall and the turbine building. This modification also includes establishing a waste transfer facility in the turbine building. This facility will be used to complete the waste packaging process and to decontaminate the waste containers in preparation for their transfer off site.

To facilitate equipment and waste transport into and out of the Reactor Building it will be necessary to remove the reactor building equipment hatch and expand the size of the hatch opening. The equipment hatch is approximately 8 feet deep and 23 feet in diameter and contains a personnel hatch. The existing access opening could be enlarged in multiple ways including squaring off the side and top to create a 25'-0" wide x 25'-0" height opening. This approach would take advantage of the flat face of the exterior 8'-0" thick wall. The existing opening can also be resized to accommodate larger dimensions.

Decontamination of components and piping systems, will be performed as required to control (i.e., minimize) worker exposure. The removal, packaging, and disposal of all piping and components that are no longer essential to support decommissioning operations will be performed. This includes the removal, packaging, and disposal of SSCs attached to the reactor vessel.

The segmentation effort required to prepare the Reactor Vessel Internals (RVI) for packaging will be performed under water. Mechanical segmentation technologies will be applied which includes use of slow rotating saw blades with a surface pattern that generates "easy to collect" shaped chips (no coiling).

The RVI component will be placed on a volume reduction station (VRS) turntable where it will be cut to the appropriate size to fit into a liner. The equipment that will be used to perform the RVI segmentation is based upon the design of the equipment used for the Zion and San Onofre decommissioning projects and incorporates lessons learned from these projects. Water filtration and chip collection systems will be installed to keep dose rates low and visibility high during the project. Segmentation of each of the RVI will be done in accordance with a predetermined segmentation plan designed to maximize the packing factor in the designated containers.

In preparation of reactor vessel (RV) segmentation, the reactor cavity sealing surface around the RV will be removed to make the gap between bio shield and RV accessible. The free-standing thermal insulation will be removed and disposed of. The RV nozzles will be cut and capped after the inside of the RV is cleaned and dewatered. Measures to cut and cap in-core instrumentation penetrations under the RV will be taken. If additional obstacles or recesses are present in the gap, they will also be removed. At this point the vertical cuts on the RV flange section will be performed.

Torch cutting equipment will be installed in the gap between RV and biological shield, supported by a frame capable of turning on its axis as an adaptation to the shielding plate.

Tenting of the cutting area will be used to add a layer of contamination control, as required. The packaging of segments can be performed in the reactor cavity deep end or on the operating floor as appropriate for the exposure rates associated with the segments. Once the RV has been cut and packaged except for the hemispherical bottom head (HBH), the inner part of the shielding plate will be removed and the same torch cutting equipment will be used to cut the RV support skirt after the HBH is attached to the polar crane. The HBH can either be disposed of in one piece or positioned in the refueling pool for manual separation into halves. If dose rates disallow for manual segmentation, a torch guide rack can perform the separation cut while the support skirt provides stability.

Other major decommissioning activities that would be conducted include the removal and disposal of the turbine, condenser, pressurizer, steam generators, reactor coolant piping, reactor coolant pumps and motors, spent fuel pool support equipment, and contaminated concrete or metals.

In addition to the reactor and large components discussed above, other plant components will be removed from the Reactor, Auxiliary Fuel Handling Building, Turbine Building, and associated support buildings radiologically surveyed and dispositioned appropriately.

3.3.2 Decontamination and Dismantlement Activities

The overall objective of D&D is to ensure that radioactively contaminated or activated materials will be removed from the site to allow the site to be released for unrestricted use. This may be accomplished by decontamination in place, off-site processing of the materials, or direct disposal of the materials as radioactive waste. A combination of these methods may be utilized. The methods chosen will be those deemed most appropriate for the circumstances.

LLRW generated from TMI-2 D&D activities will be managed in accordance with approved procedures and with the intent of complying with commercial disposal facility requirements. This includes the characterization of contaminated materials, packaging, transporting and disposal at a licensed LLRW disposal facility.

3.3.3 Radioactive Waste Management

A major component of the decommissioning work scope for TMI-2 is the packaging, transportation and disposing of contaminated/activated equipment, piping, concrete, and soil. A waste management plan will be developed consistent with regulatory requirements and disposal/processing options for each waste type at the time of the D&D activities. LLRW will be disposed of at Energy*Solutions* Clive, Utah LLRW disposal facility assuming it meets the waste acceptance criteria(s) (WAC) for the facility. Class B and Class C LLRW will be disposed of at the Waste Control Specialists (WCS) facility in Andrews, Texas.

LLRW from TMI-2 will be packaged to meet Department of Transportation (DOT) criteria for shipment and transported by licensed transporters. The waste management plan will be based on the evaluation of available methods and strategies for processing, packaging, and transporting radioactive waste in conjunction with the available disposal facility options and associated WAC.

Transportation will be largely by railroad in standard and specialty bulk packages, such as intermodal containers, and gondola type rail cars.

3.3.4 Removal of Mixed Waste

If mixed wastes are generated, they will be managed in accordance with applicable federal and state regulations. Mixed wastes will be transported by authorized and licensed transporters and shipped only to permitted and licensed facilities. If technology, resources, and approved processes are available, these processes will be evaluated to render the mixed waste non-hazardous.

3.3.5 Site Characterization

To supplement the plant historical knowledge base the TMI-2 Historical Site Assessment (HSA) and site characterization activities will be performed prior to and during the decommissioning process. The characterization will further the identification, categorization and quantification of radiological, regulated, and hazardous wastes. Surveys will be conducted as required, to establish hazardous and radioactive material contamination levels and radiation levels throughout the site. This information will be used in developing procedures, surveys and sampling plans to ensure that hazardous, regulated, and radiologically contaminated areas are remediated and to ensure that worker exposure is controlled. As decontamination and dismantlement work proceeds, radiological surveys will be conducted to maintain a current site characterization and to ensure that decommissioning activities are adjusted accordingly.

As part of the site characterization process, a neutron activation analysis calculation study of the reactor internals and the reactor vessel will be performed Using the results of this analysis (along with benchmarking surveys), neutron irradiated components will be classified (projected for the future D&D time-frame) in accordance with 10 CFR Part 61, "Licensing requirements for land disposal of radioactive waste." The results of the analysis form the basis of the plans for removal, segmentation, packaging and disposal. Other SSC associated with the reactor vessel or reactor vessel internals may be classified as Debris Material based upon the type of material adhered to it. Disposal of these SSC's will be in accordance with applicable regulatory requirements.

3.3.6 Groundwater Protection and Radiological Decommissioning Records Program

Exelon manages the groundwater (GW) protection program for the TMI site in consideration of the site monitoring agreement between Exelon and TMI-2 Solutions in accordance with the Nuclear Energy Institute (NEI) Technical Report 07-07, "Industry Groundwater Protection Initiative - Final Guidance Document" (Reference 15). This program is directed by procedures and will continue during decommissioning.

Records of leaks, spills and remediation efforts are retained and are retrievable to meet the requirements of 10 CFR 50.75(g). These records are used to determine area classification for purposes of performing surveys.

Neither the monitoring results of the groundwater protection program nor events noted in 10CFR 50.75(g) reports indicate the presence of long-lived radionuclides in concentrations sufficient to preclude unrestricted release under 10 CFR 20.1402, "Radiological criteria for unrestricted use."

3.4 Phase 3: Debris Material Management

DOE retains ultimate authority and responsibility for disposal of Debris Material, pursuant to Standard Contract DECR01-83NE44477. However, there is currently no commercially available option for final disposition of Debris Material. It is likely that once Debris Material is removed from TMI-2 and packaged, DOE will not be in a position to take possession of this material. Therefore, an ISFSI is planned to allow for dry storage of all TMI-2 related Debris Material. Debris Material will remain on the ISFSI until it is transferred to the DOE. The ISFSI will be staffed by a security force. In addition, personnel will be assigned to maintain the ISFSI and comply with the ISFSI license commitments. Shipping of Debris Material will be performed when repositories for this type of waste are developed by the DOE or other disposal options are available. Following the removal of the Debris Material the ISFSI site will be decommissioned, remediated, and surveyed per the NRC-approved License Termination Plan (LTP). Following the final site survey and NRC approval, license termination will occur.

3.5 Changes to Management and Staffing

Throughout the decommissioning process, plant management and staffing levels will be adjusted to reflect the ongoing transition of the site organization. Staffing levels and qualifications of personnel used to monitor and maintain the plant during the various periods of decommissioning will be subject to appropriate Technical Specification and Emergency Plan requirements. These staffing levels do not include contractor staffing which may be used to carry out future debris material movements, plant modifications, and the D&D license termination site restoration work. Contractors may also be used to provide general services, staff augmentation, or replace permanent staff. The monitoring and maintenance staff will be comprised of radiation protection, radiological environmental monitoring program, plant engineering and craft workers as appropriate for the anticipated work activities.

4. SCHEDULE OF DECOMMISSIONING ACTIVITIES

TMI-2 Solutions will commence decommissioning of the TMI-2 facility and will complete all activities necessary to terminate the License and release the TMI-2 site years ahead of the plan reflected in revision 2 of the PSDAR which presumes license termination occurring in 2053. Revised decommissioning schedule information was provided to the NRC in PSDAR Revision 3 (Reference 10). TMI-2 Solutions anticipates completing decommissioning of TMI-2 and releasing the TMI-2 site (except for an area potentially to be set aside for storage of Debris Material on the Independent Spent Fuel Storage Installation (ISFSI)) approximately 16.5 years after the license transfer—seventeen years earlier than the current schedule. Refer to Enclosure 1A, Figure 1A-1 for a detailed TMI-2 decommissioning schedule. A redacted version of the schedule suitable for public release is available in Enclosure 1B-1. The schedule begins with the date of license transfer and ends with the estimated date associated with completing Phase 2.

TMI-2 Solutions is responsible for developing a storage and disposal plan for any remaining Debris Material until title to the Debris Material is transferred to the DOE for disposal. The long-term management of Debris Material is addressed in the TMI-2 Solutions "Plan for Management of Debris Material" (Reference 16).

5. ESTIMATED COSTS OF DECOMMISSIONING ACTIVITIES

As presented in PSDAR Revision 3, for estimated costs under an accelerated decommissioning approach, the updated decommissioning cost analysis completed in December 2018 (Reference 17) was utilized to obtain site-specific commodity quantities, and then Energy*Solutions* applied its weights and estimated unit cost factors, which take into consideration the Energy*Solutions* execution strategy and the methods and schedule discussed in Section 4 above, to arrive at an updated estimated cost to decommission TMI-2. Energy*Solutions* also utilized the latest available industry experience (e.g., information from the Zion and La Crosse projects, and 25 years of experience in planning and engineering for other facilities, including complex decommissioning).

The cost estimate recognizes the present state of TMI-2 decontamination, contingency for unknown or uncertain conditions, the availability of low and high level radioactive waste disposal sites, and site remediation requirements. The methodology used to develop the cost estimate follows the basic approach developed by the Atomic Industrial Forum (now the Nuclear Energy Institute) in AIF/NESP-036, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates."

The decommissioning cost analysis for TMI-2 has been summarized in Table 5-1. Detailed, proprietary cost and schedule information associated with the decommissioning of TMI-2 is presented in Enclosure 1A. Non-proprietary cost and schedule information suitable for public release is available in Enclosure 1B.

This PSDAR will not be updated for minor changes in anticipated decommissioning costs. However, the status of TMI-2 decommissioning funding will continue to be reported to the NRC in accordance with 10 CFR 50.75(f)(1) and 10 CFR 50.82(a)(8)(v). This report will include, at a minimum, the assumptions used in the rates of escalation of decommissioning costs and rates of earnings used in funding projections. Additionally, TMI-2 Solutions, in accordance with 10 CFR 50.82(a)(7), will inform the NRC in writing (with a copy sent to Pennsylvania), before performing any decommissioning activity inconsistent with or making any significant schedule change from those actions and schedules described in the PSDAR, including changes that significantly increase the decommissioning cost. TMI-2 Solutions will also include an updated site-specific estimate of remaining decommissioning costs in the license termination plan in accordance with 10 CFR 50.82(a)(9)(ii)(F). The annual 10 CFR 50.75(f)(1) reports continue to demonstrate that the current fund balances are more than adequate to cover the expected future cost of decommissioning. If future estimated costs or funding levels change significantly, TMI-2 Solutions will make the necessary adjustments to ensure that sufficient funds remain available for decommissioning.

Table 5-1

Three Mile Island Unit 2 Decommissioning Cost Summary ** (thousands of 2020 dollars)	
Description	**Total Cost**
Planning & Transition	2,785
Engineering & Procedures	11,620
Site Upgrades & Preparations	35,923
Large Component & Building Source Term Reduction	64,367
Waste Packaging Transportation & Disposal	28,912
Other Direct Costs	42,125
Undistributed Costs *	269,143
Performance Baseline	**454,875**
Contingency	91,477
PHASE 1 TOTAL - SOURCE TERM REDUCTION	**546,351**
Planning & Transition	3,848
Engineering & Procedures	6,410
Large Component Removal & Building Demolition	39,144
Waste Packaging, Transportation & Disposal	192,116
Final Surveys & License Termination	5,775
Site Restoration	27,559
Other Direct Costs	21,638
Undistributed Costs *	148,806
Performance Baseline	**445,296**
Contingency	69,533
PHASE 2 TOTAL - DECOMMISIONING & LICENSE TERMINATION	**514,830**
TOTAL PROJECT	**1,061,181**

*Undistributed Costs may also be referred to as "Allocated Support Costs"

**Does not include anticipated costs for long-term storage of Debris Material after Phase 2 until acceptance by the DOE (estimated to be $59.5 million dollars).

6. ENVIRONMENTAL IMPACTS OF DECOMMISSIONING ACTIVITIES

To support the PSDAR environmental impacts review, the environmental effects of decommissioning activities planned for TMI-2, as currently understood, were evaluated to determine if potential environmental impacts are bounded by previously issued environmental impact statements. NRC regulation 10 CFR 50.82(a)(4)(i) requires that "the PSDAR include...a discussion that provides the reasons for concluding that the environmental impacts associated with site-specific decommissioning activities will be bounded by appropriate previously issued environmental impact statements." To determine if the estimated potential environmental impacts associated with TMI-2 decommissioning activities are bounded, the potential environmental impacts were compared to those evaluated in:

- NUREG-0586, Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors (Reference 11) (Referred to as the Decommissioning GEIS or GEIS), dated November 2002.

- NUREG-1496, Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities (Reference 18), dated July 1997.

- Atomic Energy Commission, Final Environmental Statement Related to the Operation of Three Mile Island Nuclear Station, Units 1 and 2 (Reference 19) (Referred to as the FES), dated December 1972.

- NUREG-0112, Final Supplement to the FES Related to the Operation of Three Mile Island Nuclear Station, Unit 2 (Reference 20) (Referred to as the Final Supplement to the FES), dated December 1976.

- NUREG-0683, Final Programmatic Environmental Impact Statement Related to Decontamination and Disposal of Radioactive Wastes Resulting from March 28, 1979 Accident Three Mile Island Nuclear Station, Unit 2 Volumes 1 and 2 (Reference 6), dated March 1981.

- NUREG-0683, Supplement No. 1, Final Report, Programmatic Environmental Impact Statement Related to Decontamination and Disposal of Radioactive Wastes Resulting from March 28, 1979 Accident Three Mile Island Nuclear Station, Unit 2, Final Supplement Dealing with Occupational Radiation Dose, October 1984 (Reference 7), dated October 1984.

- NUREG-0683, Supplement No. 2, Final Report, Programmatic Environmental Impact Statement Related to Decontamination and Disposal of Radioactive Wastes Resulting from March 28, 1979 Accident Three Mile Island Nuclear Station, Unit 2, Final Supplement Dealing with Disposal of Accident Generated Water, June 1987 (Reference 8), dated June 1987.

- NUREG-0683, Supplement 3, Programmatic Environmental Impact Statement Related to Decontamination and Disposal of Radioactive Wastes Resulting from March 28, 1979 Accident Three Mile Island Nuclear Station, Unit 2, Final Supplement Dealing with Post Defueling Monitored Storage and Subsequent Cleanup, August 1989 (Reference 9), dated August 1989.

As required, site-specific impact assessments were conducted for threatened and endangered species and environmental justice. Site-specific assessments were also performed for aquatic ecology, terrestrial ecology, and cultural and historic resources for decommissioning activities beyond the "operational area," as that term is defined in the Decommissioning GEIS (Reference 11). Although the TMI-2 site boundary is the area under the ownership and control of TMI-2 Solutions, for the purpose of assessing decommissioning environmental impacts, the operational area at TMI-2 is considered to consist of the larger Three Mile Island site, including the north end of Three Mile Island from the fence line encompassing the south parking area northward. The operational area also includes the North and South Access Roads and the junction with the mainline railroad at the North Access Road. This area encompasses the reactor and surrounding buildings, intake structure and discharge pipe, parking lots, laydown yards, landscaped areas, and transportation infrastructure. Excavation of fill within the site boundaries on Three Mile Island could potentially take place outside of the operational area.

The levels of significance assigned to site-specific environmental impacts are classified as small, moderate, or large, as defined in the decommissioning GEIS (Reference 11).

TMI-2's decommissioning plans are consistent with the methods assumed by NRC in NUREG 0683, "Programmatic Environmental Impact Statement" and associated supplements (References 6, 7, 8, and 9) and the decommissioning GEIS (Reference 11). No unique site-specific features or additional unique aspects of the planned decommissioning have been identified beyond those discussed in the PEIS and the associated supplements. Also, TMI-2 Solutions has concluded that the environmental impacts associated with planned TMI-2 decommissioning activities are either bounded by the impacts addressed by previously issued environmental impact statements or are expected, based on site specific reviews, to be small. The only exception is the need to remove the TMI-2 structures that are eligible for registry as a National Historic Structure due to its age and historical significance. This effect on historical impacts is considered large and will be mitigated by preserving models, documents and photographs of the structures before they are taken down in consultation with the Pennsylvania State Historical Preservation Office (PA SHPO).

As presented in Section 3, "Description of Decommissioning Activities," administrative, regulatory and engineering planning will occur as part of Phase 1a, while TMI-2 remains in PDMS. Upon entry into DECON, Major decommissioning activities begin with Phase 1b, which entails activities necessary to complete the cleanup from the March 28, 1979 accident (i.e., source term reduction and Debris material removal). Phase 1b decommissioning activities are evaluated against the potential environmental impacts

analyzed in the PEIS. The objective of Phase 1b decommissioning is to achieve building and equipment decontamination to the point where general area dose rates approximate those of an undamaged reactor nearing the end of its operating life. At the completion of Phase 1b, TMI-2 will prepare for Phase 2 decommissioning which entails typical D&D activities. Decommissioning activities performed in Phase 2 are assessed against the GEIS.

6.1 Environmental Impact of TMI-2 Decommissioning

The following is a summary of the reasons for reaching the conclusions that the environmental impacts of decommissioning TMI-2 are (1) bounded by the PEIS and supplements and the decommissioning GEIS or (2) site-specific, small, and bounded by other previously issued environmental impact statements, or (3) expected to be site-specific and small, apart from historical impacts. TMI-2 Solutions will notify the NRC in writing and seek appropriate environmental review in accordance with applicable NRC regulations before decommissioning activities occur that could significantly impact the environmental resource. Each environmental resource evaluated in the GEIS is addressed. As a general matter, since TMI-2 is not an operating nuclear facility it had lower generating capacity than the 1,000-MW reference pressurized water reactor (PWR) used in the GEIS to generically evaluate the environmental impacts of decommissioning, and its decommissioning impacts are therefore bounded by those assessments Further, no unique site-specific environmental features or unique aspects of the planned decommissioning activities have been identified other than the historical impact.

6.1.1 Onsite/Offsite Land Use

In Section 4.3.1 of the GEIS, the NRC generically determined land use impacts to be small for facilities having land-use changes only within the site boundary. For decommissioning that involves land use changes beyond the site boundary, the GEIS concluded that impacts could not be predicted generically and must be evaluated on a site-specific basis.

No offsite land is expected to be needed to support TMI-2 decommissioning. On-site land is expected to be sufficient for decommissioning activities (e.g., laydown, staging, handling, temporary storage, processing, packaging, and shipping of waste and materials, personnel processing, and parking). Site restoration activities include backfill of excavations. The fill needed will be obtained from material (e.g., crushed concrete) resulting from onsite demolition. If additional fill is needed, it could be excavated from onsite or, if more appropriate or practical, fill could also be purchased. The Pennsylvania Department of Environmental Protection (PADEP) regulates fill and has established criteria for clean and regulated fill and permitting requirements for beneficial reuse of regulated fill under its municipal and residual waste regulations (25 Pa. Code § 287.2 or 271.2). TMI-2 Solutions will comply with state regulations regarding the use of fill materials and will obtain permits as needed.

TMI-2 Solutions has determined that onsite land to be used to support decommissioning at TMI-2 has been previously disturbed and decommissioning activities at TMI-2 would not result in changes in onsite land use patterns. After the site is released for unrestricted use, the land could continue as industrial use or be available for other nonindustrial uses. TMI-2 Solutions concludes that anticipated onsite land use impacts are bounded by the GEIS.

6.1.2 Water Use

The GEIS observes that quantities of water required during decommissioning are trivial compared to those used when a plant is operating. The GEIS mentions construction dust abatement and decontamination (flushing systems or pressure-washing components) as typical decommissioning water uses. NRC asserted in Section 4.3.2 of the GEIS that potential impacts of decommissioning on water use at all plants are neither detectable nor destabilizing and made the generic conclusion that impacts in all cases are small.

Onsite groundwater wells are provided by TMI-1, these wells supply water for domestic water consumption at TMI-2 which includes sinks, lavatories, and garden hose stations.

Since the shutdown of TMI-2 and entry into PDMS, the demand for water has decreased significantly below the demand during operation. The operational demand for cooling water, makeup water, and service water has ceased. The demand for water needed to conduct plant decommissioning activities (flushing piping, hydro-lasing, dust abatement, etc.) will be less than the demand for industrial water supply during operation.

Because TMI-2 Solutions expects water use during TMI-2 decommissioning to be much lower than water use during operational years, which is consistent with the statements made in the GEIS, and because there is nothing about TMI-2's design, location, configuration, operating history, or decommissioning plans that would alter or contradict this generic conclusion, TMI-2 Solutions concludes that decommissioning water use impacts for TMI-2 are bounded by the analysis in the GEIS.

6.1.3 Water Quality

Decommissioning activities with potential for impacting surface water quality include Debris material removal, stabilization, large component removal, decontamination and dismantlement, and structure dismantlement. Stormwater runoff and accidental releases (spills) are the most likely sources of pollutants entering surface waters during decommissioning. The GEIS asserts that regulatory programs applicable to permitted substance releases plus the application of Best Management Practices (BMPs) for controlling stormwater runoff and erosion will render any change in surface water quality from decommissioning activities nondetectable and non-destabilizing. With respect to groundwater, the GEIS noted that demolishing concrete structures and storing rubble on site could result in changes (higher alkalinity) in local water chemistry, but the non-radiological effects of such changes on water quality would be non-detectable offsite at all nuclear power plants. Furthermore, Subtitle D of the Resource Conservation and

Recovery Act would apply to concentrated subsurface placement of demolition debris, which would limit water quality effects from using rubble and soil as fill material

During TMI-2 decommissioning, compliance with permits and adherence to erosion and sediment controls, soil stabilization practices, structural practices, and pollution prevention measures would ensure that water quality impacts from decommissioning are small and temporary. Any land disturbing activities would be of relatively short duration, permitted and overseen by responsible regulatory agencies, and guided by PADEP approved Erosion and Sediment Control BMPs. TMI-2 Solutions will continue to comply with applicable regulations which require reporting of hazardous material spills All reasonable precautions will be taken to prevent or mitigate spills of hazardous materials. TMI-2 Solutions will comply with PADEP regulations regarding fill and obtain waste permits as needed. Groundwater movement at TMI-Nuclear Station (TMINS) is into the Susquehanna River. Groundwater at the station is prevented from migrating beneath the river to the mainland by the opposing flow of groundwater from higher land to either side of the river. If any localized alteration in the groundwater chemistry associated with the use of crushed concrete as clean fill were to occur, it would not impact offsite groundwater quality.

Demolition of TMI-2 structures and buildings and related earth-moving work (digging, grading, filling) has at least a limited potential to result in erosion and sedimentation that could affect water quality, but these kinds of construction activities routinely take place around operating nuclear power plants and are subject to the provisions of state-issued permits. Cofferdams with dewatering systems would be used to isolate the shoreline area and facilitate removal of the reinforced concrete intake structures. BMPs would be employed to limit erosion while these structures are being demolished/removed. After the intake structures have been removed, measures would be employed to prevent erosion. The existing riprap at the shoreline of the north end of the island that serves to mitigate erosion would be left in place.

In Section 4.3.3 of the GEIS, NRC concluded generically that for all facilities, decommissioning impacts to surface and groundwater quality would be small. Because there is nothing about TMI-2's design, location, configuration, operating history, or decommissioning plans that would alter or contradict this generic conclusion and TMI-2 Solutions would comply with regulatory and permit requirements to protect surface water and groundwater resources, TMI-2 Solutions has determined that impacts of decommissioning on water quality would be small and bounded by the analysis in the GEIS.

6.1.4 Air Quality

The GEIS identified decommissioning activities that may affect air quality, including worker transportation to and from the site, dismantling of systems and removal of equipment, movement and open storage of material onsite, demolition of buildings and structures, shipment of material and debris to offsite locations, and operation of concrete batch plants. NRC considered the potential for adverse impacts from these activities, the greatest of which would be fugitive dust, for the range of decommissioning

plants and generically determined air quality impacts to be small.

During TMI-2 decommissioning, reasonable and appropriate control measures such as wetting of soil piles and concrete structure demolition by hammering, covering loads and staging areas, and seeding of bare areas would be implemented to control fugitive dust so that emissions do not extend offsite in compliance with PADEP regulations (25 Pa Code §123 2) PADEP requires general permits and permit conditions for portable engines and portable crushers and grinders under 25 Pa. Code §127.514, 127 611 and 127.631 Permits governing air emissions from the decommissioning activities and equipment would be obtained as required, and as needed, TMI-2 Solutions, will maintain existing air permits for equipment that will continue to be used during TMI-2 decommissioning The exhaust from commuting and shipping vehicles could affect air quality somewhat, but it is unlikely that air quality would be degraded sufficiently to be noticeable beyond the immediate vicinity of State Highway 441.

Demolition of the TMI-2 cooling towers may involve the use of explosives. The GEIS considered the use of explosives and stated in Section O.1.3 that control measures would be implemented during demolition to keep releases, including those associated with fugitive dust, within regulatory limits regardless of the methods used during demolition. PADEP also regulates use of explosives (25 Pa. Code Chapter 211), requiring their use to be designed to minimize hazards of noxious gas generation and flyrock (i.e., flying debris) as well as damages from ground vibration and airblast (i.e., airborne vibration energy). The necessary explosive use permit would be obtained and explosive use requirements and demolition industry BMPs would be implemented.

In Section 4.3.4 in the GEIS, NRC concluded that the impacts of decommissioning on air quality would be neither detectable nor destabilizing and that current and commonly used mitigation measures should be sufficient. Because (1) the air quality impacts from decommissioning activities at TMI-2 are expected to be temporary, localized, and small in magnitude, (2) reasonable and appropriate control measures would be employed, (3) the appropriate permits would be obtained, and (4) there is nothing about TMI-2 's design, location, configuration, operating history, or decommissioning plans that would alter or contradict the generic conclusion in Section 4.3.4 of the GEIS, TMI-2 Solutions concludes that air quality impacts from TMI-2 decommissioning activities are bounded by the analysis in the GEIS

6.1.5 Aquatic Ecology

Aquatic resources may be directly or indirectly impacted by decommissioning activities. Direct impacts to aquatic communities may result from shoreline or in-water construction or from dredging. Indirect impacts may result from construction-related erosion and stormwater runoff. These impacts are typically undetectable (or barely discernible) and do not destabilize any important attributes of the resources. The GEIS determined that such decommissioning activities within the operational areas of nuclear power plants, including removal of shoreline or in-water structures, would have only minor impacts on aquatic communities, provided all appropriate BMPs are employed. Therefore, the GEIS concluded generically that aquatic impacts from

decommissioning activities within a defined operational area would be small. However, the GEIS noted that if disturbance beyond the operational area is anticipated, potential impacts must be determined through site-specific analysis.

The aquatic resource of chief concern for decommissioning at TMI-2 is Lake Frederic, an impounded section of the Susquehanna River downstream of Middletown, Pennsylvania. The impoundment provides storage capacity for the York Haven Hydroelectric Project.

Biologists under contract to Metropolitan Edison, General Public Utilities Corporation, and Exelon conducted studies of Lake Frederic's aquatic communities over four distinct periods: (1) before TMI-1 and TMI-2 began operating (1970-1973), (2) during peak operation with one or two reactors in service (1974-1979), (3) the period when both reactors were shut down, following the TMI-2 accident (1980-1985), and (4) following restart of TMI-1 (1986-1990). Differences in distribution and abundance of benthic organisms and fish between years were attributed to fluctuations in environmental variables (e.g., river flow and water temperature). Taken as a whole, the studies show that the Susquehanna River in the vicinity of Three Mile Island supports a healthy benthic macroinvertebrate community and a diverse assemblage of cool water and warm water fishes. There is no indication that pollution-tolerant species or groups predominate in Lake Frederic, or that sensitive or pollution-intolerant species have been excluded.

The decommissioning GEIS identified structure dismantlement as an activity that had potential for adversely affecting aquatic communities. Direct impacts are possible from shoreline or in-water construction or from dredging. Indirect impacts may result from construction-related erosion and stormwater runoff. These impacts are typically undetectable (or barely discernible) and do not destabilize any important attributes of the resources. The GEIS concluded generically that such decommissioning activities within the operational areas of nuclear power plants, including removal of shoreline or in-water structures, would have only minor impacts on aquatic communities, provided all appropriate BMPs are employed. Therefore, the GEIS concluded that aquatic impacts from decommissioning activities would be small.

The Final Supplement to the FES considered the effects of site preparation and construction on aquatic biota in the vicinity of TMINS. The NRC staff compared biological sampling data upstream and downstream of the intake-discharge area and found no major differences in parameters measured that could be causally related to construction activities. The staff concluded that construction impacts were temporary and localized to the intake-discharge area and did not result in any irreversible adverse impacts to the local or river-wide ecosystem. Impacts associated with decommissioning are expected to be similar and bounded by those experienced during the initial construction.

TMI-2 Solutions has determined that it may be necessary to obtain fill from outside of the operational area but within the boundaries of TMINS. In a discussion of controls

employed to limit construction impacts, the original FES noted that borrow pits were sited and engineered to ensure that eroded soil was carried toward the pit rather than toward the river. A similar strategy would be employed by TMI-2 Solutions during decommissioning should it be necessary to mine fill dirt from outside of the operational area. This should reduce the potential for impacts to aquatic biota from obtaining fill dirt from areas outside of the operational area. The ground disturbance would be governed by local and state NPDES regulations to minimize runoff and sedimentation to protect surface water resources as discussed in Section 6.1.3. If the excavation of fill dirt could impact wetlands or other water resources, 25 Pa. Code Chapter 105, Dam Safety and Waterway Management, as well as the Clean Water Act (CWA) Section 404 permit requirements would apply. Given that these activities outside the operational area would be conducted in compliance with applicable regulations to protect surface water quality, impacts to aquatic communities would be small.

In conclusion, TMI-2 Solutions has determined that impacts of TMI-2 decommissioning on aquatic resources, including those outside of the operational area, would be small. Hence, TMI-2 Solutions concludes that such impacts are bounded by the analysis in the GEIS when they occur within the operational area Impacts associated with activities outside the operational area would be similar to those experienced during construction of the station and are bounded by the analyses in the FES and Final Supplement to the FES.

6.1.6 Terrestrial Ecology

Section 4.3.6.4 of the GEIS maintains that "for facilities where habitat disturbance is limited to operational areas, the impacts on terrestrial ecology (i.e., plant and animal communities) are not detectable or destabilizing," primarily because most vegetation and wildlife habitat in the operational area was removed during plant construction, which causes the terrestrial habitat to be of low-quality during plant operation and decommissioning (Reference 11). NRC staff concluded that, "for such facilities potential impacts to terrestrial ecology are small" and no further mitigation measures are warranted. Site-specific analysis is only required of licensees when decommissioning activities are likely to occur outside of the operational area, or if protected species are inhabiting portions of the operational area at the time of decommissioning (see Section 6.1.7).

Terrestrial habitats in the vicinity of TMI-2 are described in the site-specific environmental assessments listed in Section 5.0, the 2005 Wildlife Habitat Council's Site Assessment and Wildlife Management Opportunities Report (Reference 21), and the more recent Three Mile Island Wildlife Management Plan (Reference 22). Before station construction, much of Three Mile Island (approximately 270 acres of high, level ground) was leased to a farmer who cultivated corn and tomatoes. Low-lying areas along the river were, depending on elevation and frequency of flooding, occupied by either bottomland hardwood forest or stream terrace hardwood forest. All farming on the island ceased in 1968 when construction work began on TMINS.

Approximately 200 acres of natural habitat remain on the island, mostly on its southern half. The Wildlife Management Plan describes three primary habitats in the southern half of the island: wetland, grassland, and forest land. Wetlands include forested riparian ("fringe") wetlands along the river's edge, former borrow pits (dug during construction) that now have the appearance and function of natural wetlands, and seasonal/ephemeral wetlands. Grasslands and meadows are found in the southern half of the island in some of the areas where crops were once cultivated. Three forest community types are present: bottomland hardwoods, stream terrace hardwoods, and black locust forest. The mix of upland and wetland habitats that developed over a period of 40 years now provide important habitats for an array of amphibians, reptiles, small and large mammals, songbirds, wading birds, and waterfowl.

As noted earlier in this section, NRC staff concluded in the decommissioning GEIS that when decommissioning activities are limited to operational areas impacts to terrestrial resources are expected to be small. Site-specific analysis is only required of licensees when decommissioning activities are likely to occur outside of the operational area. TMI-2 Solutions has determined that it may be necessary to obtain fill from outside of the operational area but within the boundaries of the TMINS. Should this be necessary, every effort would be made to obtain fill from previously disturbed areas and avoid high-value habitats (wetlands, mature hardwood stands, grasslands). Earth-moving and digging activities associated with excavation of fill outside of the operational area could have both direct impacts (some smaller, less-mobile amphibians and reptiles could be crushed by equipment or buried by fill dirt) and indirect impacts (noise from heavy equipment could disturb birds and larger mammals in the vicinity). With several pieces of equipment operating simultaneously, noise levels can be relatively high at locations within several hundred feet of active construction sites. But construction noise attenuates rapidly over relatively short distances, particularly if dense vegetation is present. Based on noise levels known to elicit a startle response in wildlife (> 75 dBA), the zone of disturbance generally extends only 400-800 feet from a construction site. Any disturbance associated with excavating fill material would be temporary, measured in days or weeks or months rather than years, and would have no lasting impact on any ecologically important species. Excavation of fill and restoration activities would, to the extent practicable, be scheduled so as to minimize impacts to nesting birds in compliance with the Migratory Bird Treaty Act.

The FES and the Final Supplement to the FES summarized impacts of construction of station facilities on terrestrial communities. Impacts included permanent loss of native vegetation (wildlife habitat) and noise-related disturbance of wildlife. Impacts associated with excavating fill from outside the operational area to support the decommissioning activities would be similar to those observed during construction of the station and described in the FES (and Supplement) but less severe, because the area disturbed would be much smaller.

In the decommissioning GEIS, the NRC concluded that impacts from decommissioning on terrestrial resources are small provided these activities take place within the operational area, which is assumed to have minimal value as wildlife habitat. Outside of

a grassy (mowed) field and adjacent patch of woods between the North Access Road and northern end of the island and another small woodlot southeast of the TMI-2 cooling towers, the TMI-2 operational area contains very little wildlife habitat. This field and the patches of woods provide habitat for small mammals and songbirds that can tolerate relatively high levels of human activity and noise and are sometimes collectively referred to as "backyard wildlife." Most of the operational area is occupied by industrial facilities (buildings and cooling towers) and gravel-covered parking lots and equipment storage areas. A site-specific analysis was conducted of impacts of obtaining fill from outside the operational area and determined impacts to terrestrial resources would be negligible, provided sensitive habitats are avoided and construction BMPs are employed. Impacts associated with activities outside the operational area would be similar to those experienced during construction of the station and are bounded by the analyses in the FES and the Final Supplement to the FES. Therefore, TMI-2 Solutions concludes that impacts of TMI-2 decommissioning on terrestrial resources are small and bounded by the GEIS and previous TMINS environmental impact statements.

6.1.7 Threatened and Endangered Species

The GEIS lists stabilization, large component removal, decontamination and dismantlement (removal of contaminated soil), and structure dismantlement as activities with potential to impact threatened and endangered species. The GEIS did not make a generic determination on the impact of decommissioning on threatened and endangered species but noted that impacts to these species are expected to be minor and non-detectable when activities are confined to the site operational area. Impacts are to be determined on a site-specific basis, paying particular attention to activities outside of the developed operational area. Noise and dust generation from construction activity and increased truck traffic, rather than direct impacts such as habitat destruction, are the primary concerns.

Six species are federally listed as endangered or threatened in Dauphin, Lancaster or York counties as shown in Table 6-1. No bog turtles, Northeastern bulrushes, Northern long-eared bats, dwarf wedgemussels, Indiana bats, or Atlantic sturgeons have been observed on or immediately adjacent to TMI.

Table 6-1
Federally Protected Species in Dauphin, Lancaster, and York Counties, PA

County	Scientific Name	Common Name	Federal Status*	State Status**
Dauphin, Lancaster, York	*Acipenser oxyrinchus*	Atlantic sturgeon	LE	PE
Dauphin	*Scirpus ancistrochaetus*	Northeastern bulrush	LE	PE
Lancaster	*Alasmidonta heterodon*	dwarf wedgemussel	LE	PE
York	*Myotis sodalist*	Indiana bat	LE	PE
Dauphin, Lancaster	*Myotis septentrionalis*	Northern long-eared bat	LT	PE
Lancaster	Glyptemys muhlenbergii	bog turtle	LT	PE

*LE – Listed Endangered, LT – Listed Threatened
** PE – Pennsylvania Endangered, DL - Delisted
Data from Pennsylvania Natural Heritage Program, 2020b

With respect to conservation efforts at TMINS, three species are particularly noteworthy: bald eagle, peregrine falcon, and osprey.

Bald eagles first nested on Three Mile Island in 2010 but were seen foraging in the area for two or three decades prior to this date. Bald eagles were delisted by the USFWS in 2007 (Federal Register Volume 72, No. 130, July 9, 2007) and were subsequently delisted by the Commonwealth of Pennsylvania in 2014 (44 Pa.B. 1429, March 15, 2014). Although no longer listed under the Endangered Species Act, they are fully protected under another federal statute, The Bald and Golden Eagle Protection Act There are two active bald eagle nests on Three Mile Island, one in the wooded area at the northern end of the operational area, north of the North Access Road, and one in a forested area south of the operational area. Both nests have been active for several years, notwithstanding their proximity to a busy, noisy industrial facility. The north nest is exposed to noise from commuting workers' vehicles that peaks during shift changes as well as noise from delivery/service vehicles. The south nest is adjacent to the South Access Road, which is used infrequently by TMINS employees but was exposed to high levels of noise and activity during refueling outages, when the South Access Road is used by visiting outage workers for 3-4 weeks. Given that bald eagles have nested successfully on Three Mile Island since 2010 in spite of relatively high levels of disturbance (road noise, night lighting, public address system) associated with both normal plant operations and refueling outages, there is no reason to believe that a similar level of disturbance during decommissioning would prevent eagles from nesting or from rearing and fledging young.

Peregrine falcons first nested on the roof of the TMI-1 reactor building in 2002 and have produced two or three offspring annually since. Attempts to lure the nesting pair to other locations have been successful; however, a new nest has been observed on the TMI-2 reactor building several years ago, and efforts to remove it have not been attempted. Peregrine falcons are known to exhibit a high degree of nest fidelity, returning to the

same breeding territory and nest location year after year. If the peregrine falcons continue to nest on the TMI-2 Reactor Building and present a risk of effecting the schedule for demolishing TMI-2 structures during the falcon nesting season, TMI-2 Solutions plans to contract with specialists prior to building demolition to determine the most feasible method to prevent the falcons from nesting on the structure without harming them and attempt to relocate their nesting site.

Ospreys have nested on the TMI-1 met tower since 2005. They also nest on two platforms erected on the south end of the island Ospreys were delisted by the Commonwealth of Pennsylvania in 2017 (47 Pa.B. 1467, March 11, 2017). They continue to be protected by the Pennsylvania Game and Wildlife Code (Title 34, Pennsylvania Consolidated Statutes), like all raptors in the Commonwealth, but are not afforded the same level of protection as listed (threatened or endangered) species.

No aquatic species listed by the Commonwealth of Pennsylvania or the USFWS (or proposed for listing by the USFWS) has been observed or collected in Lake Frederic and there is no protected or critical habitat present. Therefore, none of the decommissioning activities should affect a protected aquatic species. TMI-2 Solutions will consult with state and federal resource agencies before Major decommissioning activities in water commence to ensure that no listed aquatic species has been discovered in the intervening years and that no species previously documented in Lake Frederic has, in the intervening years, been afforded state or federal protection.

The American holly (*Ilex opaca*), state listed as threatened, was observed in the southern portion of the island during a Site Assessment and Wildlife Opportunities Report carried out for TMI-1 license renewal. With the exception of the bald eagle, peregrine falcon, osprey, and American holly, no additional known occurrences of state-listed species are known on TMI.

Decommissioning activities with greatest potential for directly and indirectly affecting terrestrial plant and animal communities are those scheduled, when major reactor structures are to be demolished such as the TMI-2 cooling towers using either explosives or mechanical means. As discussed in Section 6.1.1, above, land within the operational area is sufficient to provide space for laydown yards, equipment or materials storage, temporary offices, and other decommissioning support areas or structures. Current parking facilities have been adequate to support refueling and maintenance outages over the years and are assumed to be adequate to support decommissioning. Because there is ample open space to support TMI-2 decommissioning operations, there would be no reason to clear any land outside of the operational area. Therefore, there would be no direct impacts to the habitat of any threatened or endangered species. Excluding the mining of fill dirt, all decommissioning activities will be confined to the operational area, which does contain a large (approximately 14-acre) field (met tower area) and two small (4-and 8-acre) patches of woods, but these habitats are adjacent to roads and facilities, thus exposed to a constant level of noise and human activity.

Demolition of the TMI-2 powerblock structures and cooling towers appears more likely to disturb wildlife, including nesting eagles and peregrine falcons. Demolition of buildings and structures will likely involve large cranes, excavators, pneumatic hammers, concrete and rebar saws and other extremely noisy equipment. These demolition and dismantlement activities are likely to take several weeks or months at a time. Although birds and small mammals on Three Mile Island have apparently become accustomed to traffic noise, diesel generator startup noise, public announcement system noise, and an array of other industrial noises, they are not routinely exposed to noise from the heavy equipment used in demolition work. Taking down the cooling towers with explosives would appear to be less of a concern, because animals would be exposed to elevated sound and pressure levels for a very brief period, perhaps seconds. The cleanup of cooling tower rubble is expected to create more of a disturbance than the implosion/explosion.

All of the activities expected to generate high noise levels will take place in areas well removed from the highest-quality wildlife habitat on the island, the grasslands, wetlands, and forests in the southern portion of the island. As noted in Section 6.1.6, above, the zone of disturbance generally extends only 400-800 feet from a construction site. The northern eagle nest is approximately 2200 feet from the closest structure that will be demolished, the TMI-2 auxiliary building. TMI-2 Solutions will consult with appropriate state and federal resource agencies when a decision is reached on timing and method of cooling tower removal to ensure that agency concerns are addressed.

All decommissioning activities at TMI-2 (with the possible exception of mining fill material) will take place within the site operational area, which was disturbed during construction of the facility and contains only isolated patches of wildlife habitat. The potential impacts of mining fill material outside of the operational area on (non-protected) terrestrial resources were considered in depth in Section 6.1.6 and could, depending on the site chosen, include (1) removal of vegetation, (2) displacement and/or elimination of smaller, less-mobile animals, and (3) noise or activity-related disturbance of birds and larger mammals. Any of the state-listed birds known to occur in the Three Mile Island vicinity could be disturbed by excavation work but would be expected to simply move away from the sources of disturbance (workers, vehicles, earth-moving equipment).

NRC has determined that potential impacts of decommissioning on threatened and endangered species must be evaluated on a site-specific basis. TMI-2 Solutions has determined that none of the planned decommissioning activities at TMI-2 would eliminate or degrade the natural habitat of any state or federally listed species. The TMI-2 reactor building, which has been used by nesting peregrine falcons for the last several years would be razed. Any indirect (disturbance-related) impacts from construction noise and human activity related to TMI-2 decommissioning would be localized, of short duration, and ecologically insignificant. Birds and mammals that are intolerant of noise and human activity are expected to simply avoid (or move away from) noisy construction sites. TMI-2 Solutions therefore concludes that adverse impacts to

threatened and endangered species from TMI-2 decommissioning activities would be small but addressed in accordance with appropriate regulations.

Based on the site-specific findings summarized in this section, TMI-2 Solutions concludes that TMI-2 decommissioning activities are not likely to adversely affect any threatened or endangered species and will have no effect on any designated critical habitat. However, in the future, when TMI-2 decommissioning activities, such as demolition or disturbance of land areas that could affect a protected species have been finally determined and scheduled, TMI-2 will update the site specific assessment of environmental impacts to protected species in the PSDAR, as needed. To comply with its continuing obligation under 10CFR 50.82(a)(6) to assure that no decommissioning activity that would result in significant environmental impacts would be performed without NRC review, the results of the assessment would be provided to the NRC in accordance with applicable NRC regulations.

6.1.8 Radiological

The GEIS considered radiological doses to workers and members of the public in Section 4.3.8 when evaluating the potential consequences of decommissioning activities.

6.1.8.1 Phase 1b Occupational Dose

Phase 1b includes source term reduction and decontamination of the plant to the point where general area dose rates approximate those in an undamaged reactor facility nearing the end of its operating life. Phase 1b is considered a continuation of the cleanup that was not completed prior to entry into PDMS. In other words, it meets the definition of the delayed cleanup alternative defined by NRC staff in PEIS Supplement 3 (Reference 9).

PEIS, Supplement 3, Table 3.18 "Occupational Radiation Dose Estimate for Delayed Cleanup" (Reference 9) provided estimated occupational dose ranges for remaining cleanup activities. The occupational radiation dose from placing the TMI-2 facility in PDMS, maintaining PDMS for 33 years, and then completing cleanup is estimated to be 1300 to 3300 person-rem. These doses are in addition to the occupational dose already received and the dose required to complete defueling.

As discussed in PEIS Supplement 3, the estimates were based on a task-by-task analysis of the work to be done and were presented as a range of values because of uncertainties in the cleanup process, the technology that will be available when post-storage cleanup is performed as well as the location and depth of penetration of the contamination. For example, it is not known if workers would need to enter the basement during decontamination, and if waste would have to be manually packaged when removed from the basement. A discussion of the methodology used to calculate the occupational doses is found in PEIS Supplement 3, Appendix H.

Phase 1b is scheduled to start in July 2022, corresponding to approximately 33 years from the date of publication of PEIS Supplement 3 and has a scheduled duration of

approximately 6.5 years which makes it reasonable to assume an occupational dose estimate for remaining cleanup activities in Phase 1b of 1,300 to 3,300 person-rem.

Since the 1979 accident, significant radioactive decay has occurred resulting in greatly reduced impacts of occupational dose to plant workers. The TMI-2 Radiation Protection Program and associated implementing procedures will incorporate ALARA principles into work activities to manage occupational dose to the workforce and minimize radiation exposure to the extent practicable. In addition, advances in technology since entry into PDMS will be implemented in order to manage occupational dose. Examples of technology and methods for consideration to achieve ALARA goals include robotics, remote dismantling of systems and components, remote visual monitoring and remote radiological monitoring.

LLRW will be disposed of at Energy*Solutions* Clive, Utah LLRW disposal facility assuming it meets the waste acceptance criteria(s) (WAC) for the facility. Class B and Class C LLRW will be disposed of at the Waste Control Specialists (WCS) facility in Andrews, Texas.

Occupational dose will be limited to 5 rem/year total effective dose equivalent (TEDE) as required by 10 CFR 20.1201(a)(1)(i) and will be administratively controlled as specified in the Radiation Protection Program to a lower value to ensure that personnel do not exceed regulatory limits. TMI-2 Solutions will develop a Radiation Protection Program that addresses occupational dose administrative limits. The implementation of administrative limits ensures compliance with regulatory limits for occupational dose. It is also anticipated that administrative practices will result in equitable distribution of dose among available qualified workers to ensure collective dose to the work force is maintained ALARA. Dose estimates and tracking of accumulated occupational dose will be an integral part of the radiological work planning process during Phase 1b. As planning for the Phase 1b scope of source term reduction progresses, planners will develop detailed source term removal plans for each cubicle or component of the plant using current radiological survey data, plant drawings and walk down information.

TMI-2 Solutions has and will continue to evaluate occupational dose impacts as planning during Phase 1a proceeds and as new data are collected during Phase 1b activities. Administrative controls, as well as the use of advanced technologies will ensure that potential impacts of radiological dose to workers will be small.

6.1.8.2 Phase 2 Occupational Dose

The goal of Phase 1b is to reduce source term and remove Debris material to the extent where general area dose rates approximate those in an undamaged reactor facility nearing the end of its operating life. Therefore, following the completion of Phase 1b, decommissioning activities performed during Phase 2 represents an undamaged reactor decontamination and dismantlement. Because the ALARA program continues to reduce occupational doses, the 2002 GEIS is expected to bound occupational dose impacts for workers during Phase 2.

In much the same manner as Phase 1b, occupational dose to workers during Phase 2 will be limited to 5 rem/year TEDE as required by 10 CFR 20.1201(a)(1)(i) and will be administratively controlled to a lower value to ensure that personnel do not exceed regulatory limits. TMI-2 Solutions will develop a Radiation Protection Program that addresses occupational dose administrative limits. The implementation of administrative limits ensures compliance with regulatory limits for occupational dose. It is also anticipated that administrative practices will result in equitable distribution of dose among available qualified workers to ensure collective dose to the work force is maintained ALARA. Dose estimates and tracking of accumulated occupational dose will be an integral part of the radiological work planning process during Phase 2.

TMI-2 Solutions will continue to evaluate occupational dose impacts as planning for Phase 2 proceeds and as new data are collected during Phases 1b and Phase 2 activities. Administrative controls, as well as the use of advanced technologies will ensure that potential impacts of radiological dose to workers during Phase 2 will be small.

TMI-2 Solutions has elected to decommission the TMI-2 facility using the DECON method. It is expected that the occupational dose required to complete the decommissioning activities at TMI-2 will be within the range of the cumulative occupational dose estimates for decommissioning PWR plants of 560-1215 person-rem provided in Table 4-1 of the GEIS. At the commencement of Phase 2 decommissioning, the TMI-2 facility will generally be in a similar radiological condition as would a plant at the end of its operational life. Therefore TMI-2 is bounded by the PWRs evaluated in the GEIS. The Radiation Protection Program and associated implementing procedures ensures that occupational dose is maintained ALARA and well within 10 CFR Part 20 limits. There are no unique characteristics at TMI-2 in Phase 2 that would invalidate this conclusion.

6.1.8.3 Public Dose

Section 4.3.8 of the GEIS considers doses from liquid and gaseous effluents when evaluating the potential impacts of decommissioning activities on the public. Table G-15 of the GEIS compared effluent releases between operating facilities and decommissioning facilities and concluded that decommissioning releases are lower. The GEIS also concluded that the collective dose and the dose to the maximally exposed individual from decommissioning activities are expected to be well within the regulatory standards in 10 CFR Part 20 and Part 50.

Prior to the March 28, 1979 accident at Unit 2, there was no detectable radiological impact due to the normal operation of either unit. From March 28, 1979 on, there were some transient, low level increases in the immediate radioenvironment. The increases were limited to iodine-131 in air and milk, and the gamma immersion dose. The average incremental radiological doses associated with radioactivity increases along critical pathways were:

- Inhalation of airborne iodine-131 resulted in about 1.38 mrem to the adult thyroid;
- ingestion of iodine-131 in cows' milk resulted in about 0.67 mrem to the infant thyroid, and
- the gamma immersion dose resulted in about 2.4 mrem to the adult

There were no detectable increases found in the local off-site radioenvironment due to the accident after April 12, 1979, for gamma immersion dose, May 19, 1979, for iodine-131 in cows' milk, and May 3, 1979, for iodine-131 in air.

The expected radiation dose to the public from TMI-2 decommissioning activities will be maintained within regulatory limits through the continued application of the TMI-2 Radiation Protection Program and associated implementing procedures as well as contamination controls combined with the reduced source term available in the facility.

Section 4.3.8 in the GEIS states that radionuclide emissions in gaseous and liquid effluents are reduced in facilities undergoing decommissioning A review of the Annual Reports of environmental monitoring at TMI-2 for the years from 1979 through 2019 demonstrate that radioactivity levels in the offsite environment are not measurably increasing, and that the operation of TMINS had no adverse radiological impact on the environment. It is reasonable to expect that public doses during decommissioning would also be well within such limits. Therefore, TMI-2 Solutions concludes that the impacts of TMI-2 decommissioning on public dose are small and are bounded by the GEIS.

6.1.8.4 Conclusion

TMI-2 Solutions concludes that radiological impacts of TMI-2 decommissioning are small for the following reasons:

- During Phase 1b the TMI-2 Radiation Protection Program and associated implementing procedures will ensure that dose at the site boundary remain below regulatory limits. Implementation of these procedures take into account detailed work planning, and execution of the D&D work and support activities, including measures to maintain occupational dose ALARA and below the occupational dose limits in 10 CFR Part 20 during decommissioning.
- At the conclusion of Phase 1b decommissioning, and prior to the commencement of Phase 2 decommissioning, the TMI-2 facility will generally be in a similar radiological condition as would a plant at the end of its operational life. Therefore TMI-2 is bounded by the PWRs evaluated in the GEIS. The GEIS generic evaluation of radiological impacts applies to an undamaged PWR. Both occupational dose and public dose should be similar to those of other PWR plants, indicating that TMI-2 doses in Phase 2 are typical.
- Deferred or delayed decommissioning as in the case of PDMS allows for radionuclides to decay over time, resulting in less dose at the time of decommissioning.

- Public doses during TMI-2 PDMS operations have been well within the NRC-established public dose limits and are reasonably expected to decrease during decommissioning.

Therefore, TMI-2 Solutions further concludes that the radiological impacts of TMI-2 decommissioning are bounded by the analysis in the PEIS for Phase 1b and by the GEIS for Phase 2.

6.1.9 Radiological Accidents

Section 4 3 9 in the GEIS examined a range of radiological accidents hypothetically possible during the decommissioning period. These included anticipated operational occurrences, nonnuclear fuel-related accidents, and nuclear fuel-related accidents. NRC determined that many of these accidents had been previously analyzed in environmental reviews for the operation of the plant. The GEIS concludes that impacts of radiological accidents of all types applicable to decommissioning activities are small.

Given their potential to result in offsite doses, the GEIS considered spent fuel accidents of most concern for decommissioning. Once in dry cask storage, however, spent fuel management is no longer within the scope of decommissioning environmental review because NRC evaluated the environmental impacts of continued spent fuel storage for all nuclear power plants in NUREG-2157, "Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel" (Reference 23). Consequently, the only accidents of importance to offsite doses during decommissioning are those involving spent nuclear fuel in the spent fuel pool. Spent fuel pool accidents would no longer be applicable after the spent fuel is moved to dry cask storage

There is no spent fuel being stored in a spent fuel pool at TMI-2. The TMI-2 facility is in a defueled condition; 99% of the fuel has been removed from the site and is being safely stored in an ISFSI at the Idaho National Laboratory. There are no design basis accidents (DBA) associated with TMI-2 and the capability to prevent or mitigate the consequences of a DBA are not applicable to TMI-2.

An unanticipated event and a radiological accident have been evaluated. The fire inside of containment unanticipated event is applicable in Phase 1a (PDMS) and the High Integrity Cask (HIC) fire accident is applicable during decommissioning in Phase 1b and Phase 2.

GPU Nuclear performed an unanticipated events analysis as presented in Appendix H, Section 8.2 of the PDMS Safety Analysis Report (SAR). The purpose of the analysis was to determine the unanticipated event that produces the bounding radiological dose at the site boundary during PDMS. This provides the measure upon which to ensure that any activity performed during PDMS will not exceed the radiological dose at the site boundary. The guidance of NUREG/CR-2601 "Technology, Safety and Costs of Decommissioning Reference Light Water Reactors following Postulated Accidents," (Reference 24) was used as the basis for the selection of the unanticipated events that were analyzed. The results of this analysis indicate that a fire in the reactor building

(RB) with the RB purge system in operation is the unanticipated event that produces the bounding radiological dose at the site boundary during Phase 1a (PDMS). No major decommissioning activities will occur during Phase 1a. Therefore, an unanticipated event involving a major fraction of the remaining inventory of radionuclides is not likely.

The fire inside of the RB with the RB ventilation and purge in operation was evaluated by the NRC as part of the Exelon request for exemption from portions of 10 CFR 50.47 and 10 CFR 50, Appendix E (Reference 25). Per the TMI-2 Fire Protection Program Evaluation (Reference 26) which was used as an input to the exemption request, the dose at the exclusion area boundary is 13.5 mrem expressed as a bone dose. Due to the isotopic mix (e.g., negligible amounts of iodine) and the nature of potential releases (i.e., particulate matter), a more restrictive basis (i.e., the critical organ) for comparison was selected for reporting dose for TMI-2 fires.

The results of the NRC evaluation confirm the conclusions presented in the PDMS SAR. The TMI-2 facility would not have consequences that could potentially exceed the applicable dose limits in 10 CFR 100.11 and 10 CFR 50.67 and the dose acceptance criteria in Regulatory Guide 1.183 "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors" (Reference 27). The analysis demonstrates that 365 days after permanent cessation of power operations, the radiological consequences of the analyzed unanticipated event will not exceed the limits of the EPA early phase Protective Action Guides (PAGs) at the Exclusion Area Boundary (EAB). The NRC approved the exemption request to eliminate offsite emergency response (Reference 28) in part based upon the FPPE (Reference 26). As stated in Reference 28 the NRC staff concluded that granting the requested exemptions to Exelon would provide reasonable assurance that an offsite radiological release will not exceed the limits of the EPA PAGs at the site's exclusion area boundary for remaining applicable design-basis accidents. The summary of the NRC analysis of this event relative to dose at the site boundary is presented in Reference 28.

After the issuance of Reference 28, the Fire Protection Program Evaluation (Reference 26) was revised and reissued as Revision 13 (Reference 29). Revision 13 of the Fire Protection Program Evaluation uses updated source term information which accounts for 26 years of decay (1992 through 2018) as well as accounting for additional loose contamination. Federal Guidance Reports 11 and 12 are applied for dose conversion factors.

The results presented in Reference 29 indicate that the fire inside of the RB with the RB ventilation and purge in operation remains the most limiting unanticipated event and that the dose at the exclusion area boundary is 12.4 mrem expressed as a bone dose which is less than 13.5 mrem as reported in Reference 28. The dose at the site boundary does not exceed the limits presented in 10 CFR 100.11 and the EPA PAGs.

Following Phase 1a, TMI-2 will transition into Phase 1b. Prior to performing any major decommissioning activities an analysis of credible accidents that may occur during Phase 1b was performed in order to determine the limiting radiological dose at the site

boundary.

The results of the analysis indicate that a HIC fire is the event that could occur during decommissioning with the potential of maximizing dose at the site boundary. The HIC fire event is postulated to occur either inside or outside of containment. Outside of containment the release involves an unfiltered, ground level release that takes no credit for the operation of any SSCs to mitigate the consequences of the event. The dose at the site boundary associated with the HIC fire occurring outside of containment bounds the dose from the HIC fire inside of containment with the containment engineered access equipment hatch open, as well as with or without RB ventilation and purge system in operation and does not exceed the requirements of 10 CFR 100.11 and the EPA PAGs. The dose at the EAB for a HIC fire occurring outside of containment is 975 mrem; the dose at the EAB for a HIC fire occurring inside of containment is approximately 490 mrem, which is still below the requirements of 10 CFR 100.11 and the EPA PAGs. Reference 12 provides a detailed discussion relative to the determination of the HIC dose.

There are no postulated accidents that can occur inside of the RB during Phase 1b or Phase 2 that result in the dose at the site boundary exceeding the limits of 10 CFR 100.11 and the EPA PAGs including such times as when the containment engineered access equipment hatch is open. The D&D process includes many evolutions that will require the equipment hatch and other RB access points to be open to allow movement of equipment, waste, and other materials into and out of the RB. The Radiation Protection Program will identify the controls that will be implemented through procedures during D&D activities occurring inside of the RB. Implementation of these procedures take into account detailed work planning, and execution of the D&D work and support activities, including measures to maintain occupational dose ALARA and below the occupational dose limits in 10 CFR Part 20 during decommissioning.

TMI-2 Solutions concludes that radiological accident impacts of decommissioning activities at TMI-2 would be small and are bounded by the analysis in the GEIS. TMI-2 Solutions knows of no unique features or conditions at TMI-2 that would lead to a conclusion concerning radiological accidents different than that reached in the GEIS.

6.1.10 Occupational Issues

Section 4.3.10 of the GEIS concluded that impacts due to occupational issues would be small for all plants based on strict adherence to Occupational Safety and Health Administration (OSHA) safety standards, practices, and procedures.

TMI-2 decommissioning will be conducted under a comprehensive non-radiological safety and health program meeting OSHA, NRC, and TMI-2 Solutions procedural requirements. Historically, the nuclear power industry has lower rates of injuries and illnesses than other industries. Demolition of the TMI-2 cooling towers may involve the use of explosives. NRC considered the use of explosives during decommissioning and specifically mentioned the hazards of fugitive dust and noise levels from blasting in

Sections O.1.3 and O.1.14 of the GEIS. As discussed in Section 6 1.4, PADEP regulates the use of explosives, requiring their use be designed to minimize hazards to workers and the public. Blasting activities would take place under the control of licensed personnel and the blasting activities would be subject to state issued permits that ensure the activity can be conducted safely. OSHA regulations for worker protection would also ensure that the appropriate worker protection programs such as a respiratory protection plan and hearing protection plan were in place.

The TMI-2 site-specific decommissioning plan poses no unique hazards from what was evaluated in the GEIS. Accordingly, TMI-2 Solutions concludes that anticipated impacts resulting from nonradiological occupational issues during TMI-2 decommissioning are small and thus bounded by the analysis in the GEIS.

6.1.11 Cost

A site-specific decommissioning cost analysis is presented in Section 5.0. Section 4.3.11 of the GEIS recognizes that an evaluation of decommissioning cost is not a National Environmental Policy Act (NEPA) requirement. Therefore, a bounding analysis is not applicable.

6.1.12 Socioeconomics

Section 4.3.12 of the GEIS evaluated changes in workforce and population changes, changes in local tax revenue, and changes in public services. The GEIS concluded that socioeconomic impacts are neither detectable nor destabilizing and that mitigation measures are not warranted. TMI-2 ceased operations in 1979 and has been maintained in a PDMS condition since December 1993 by a limited workforce provided by Exelon under a monitoring services agreement.

The results of the TMI-1 socioeconomic analysis state that impacts to socioeconomic resources as a result of TMI-1 decommissioning are small and bounded by the analysis in the GEIS (Reference 11). Considering TMI-2 has been in PDMS for approximately 27 years the impact upon socioeconomic resources while maintaining the PDMS condition are considered small relative to the results of TMI-1 socioeconomic analysis. Furthermore, the workforce associated with TMI-2 decommissioning at its highest is small, approximately 135 individuals, as compared to the last two TMI-1 refueling outages (T1R22 (2017) 936 contractors badged, T1R21 (2015) 1705 contractors badged) and not expected to destabilize housing prices or impact tax revenues as discussed in the TMI-1 socioeconomic analysis. Therefore, based on the findings summarized above, TMI-2 Solutions concludes that impacts to socioeconomic resources from TMI-2 decommissioning would be small and thus bounded by the analysis in the GEIS.

6.1.13 Environmental Justice

Section 4.3.13 of the GEIS determined environmental justice to be an environmental impact area for which no generic conclusion could be determined due to its site-

specific nature. Therefore, the GEIS indicates that site-specific assessments for each decommissioning nuclear power plant must be prepared.

Since TMI-2 occupies the same operational area as TMI-1, and in consideration of the proximity of TMI-1 to TMI-2, it is concluded that the results of the site-specific assessment of environmental justice prepared by Exelon (Reference 30) for TMI-1 is applicable to TMI-2.

The Exelon site-specific assessment of TMI-1 examined the geographic distribution of minority and low-income populations within a 50-mile radius of TMINS using the 2012-2016 American Community Survey 5-year estimates. Census block groups containing minority populations were identified and were concentrated in the larger metropolitan areas of Harrisburg, Reading, Lancaster, Lebanon, and York. The nearest minority population blocks are located southeast of Harrisburg, about 5-6 miles northwest of TMINS. Census block groups containing low-income populations were concentrated in the cities of Harrisburg, Reading, Lancaster, and York. The nearest low-income populations are located southeast of Harrisburg, about 5-6 miles northwest of TMINS.

The site-specific assessment performed for TMI-1, determined that decommissioning impacts to all resource areas would be small, indicating that the effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. Because no member of the public will be substantially affected, there can be no disproportionately high and adverse impact or effects on minority and low-income populations resulting from the decommissioning of TMI-1.

TMI-2 Solutions concurs with the results of Exelon's analysis and therefore concludes that the effects of decommissioning TMI-2 are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. Because no member of the public will be substantially affected, there can be no disproportionately high and adverse impact or effects on minority and low-income populations resulting from the decommissioning of TMI-2.

6.1.14 Cultural, Historic, and Archeological Resources

Section 4.3.14 of the GEIS determined that potential effects of decommissioning on cultural, historical and archaeological resources would be small for all plants when the decommissioning activities are confined to the operational area. However, impacts outside the operational area "must be determined through site-specific analysis." TMI-2 Solutions anticipates that decommissioning activities will take place within the TMI-2 operational area, except for the possible excavation of fill from onsite areas outside of the operational area to backfill the foundations of buildings and structures after demolition

In Section 4.3.14.2 of the GEIS, NRC noted the potential for the nuclear facility itself to be potentially eligible for inclusion in the National Register of Historic Places (NRHP),

especially if it is older than 50 years and represents a significant historic or engineering achievement. TMI-2 is a typical mid-twentieth century light water reactor. The design, engineering processes, and construction of TMI-2 are unexceptional and lacking any major engineering innovations. The engineering drawings from the station will be archived by records management until decommissioning is complete.

TMI-2 was classified as a historic structure eligible for listing on the NRHP in 2010 (Reference 31). In Reference 32, TMI-2 Solutions acknowledged that TMI-2 is a historic site and that cultural resources exist on Three Mile Island and requested input from the State Historic Preservation Office (SHPO) regarding concerns that should be considered in the assessment. Reference 33 presents the SHPO response. References 32 and 33 are provided in Attachment 4. TMI-2 Solutions is working with the SHPO to determine which documents, models and artifacts should be preserved and turned over to state historic collections.

Because TMI-1 and TMI-2 are located within the same operational area with virtually identical resources, TMI-2 Solutions benefits from previous historic and archaeological database searches. Information provided in Exelon's TMI-1 PSDAR (Reference 30), reports locations of inventoried resources on the island and within an approximately 6-mile radius.

One archaeological site within the TMI-1 and TMI-2 operational area (identified on the NRHP as 36DA50) is believed to remain intact. The site is north of the access road at the northern end of the operational area. Its eligibility for listing on the NRHP is categorized as undetermined due to insufficient information, presumably due to uncertainty about its current condition.

Six archaeological sites are located on the central and southern portions of Three Mile Island outside the TMI-1 and TMI-2 operational area but within the TMINS property boundary. In 2016, one of these archaeological sites (36DA 100) was determined to be eligible for the NRHP. That site is at the south end of the island near the South Access Road. Another archaeological site (36DA98) is immediately south of the operational area in a location used for staging and soil borrowing during construction of the station, and it was likely removed by those construction activities. A third site (36DA51) has been determined to be not eligible for listing, and three more sites (36DA99, 36DA 101, and 36DA235) are considered unevaluated due to insufficient information.

Beyond Three Mile Island operational area, but within a 6-mile radius, there are 13 properties currently listed on the NRHP and 32 NRHP-eligible properties. One property, a section of the Pennsylvania Railroad Main Line linear historic district, lies 0.4 miles away from TMI-1 and TMI-2 and the remaining properties are more than 1 mile away.

Exelon developed a map assessing the archaeological potential of the entirety of Three Mile Island. The map depicts much of the island as either disturbed due to construction of the station or as having low potential due to distance from river channels and reduced likelihood of deep, Holocene epoch alluvial deposits. The perimeter of the island,

including the northern end within the TMINS operational area where one site is located, and the southern end, where four sites occur, has high archaeological potential. Away from the shoreline, the southern end of the island has moderate archaeological potential, including areas adjoining the TMI-1 operational area along the South Access Road.

TMI-2 Solutions will use the Exelon Cultural Resources Protection Plan and Archaeological Resources Erosion Monitoring Plan, which will provide protocols for ensuring continued stewardship of cultural resources on Three Mile Island during the TMI-2 decommissioning project. In addition, procedures will provide direction and contact information should an unanticipated cultural resource be encountered.

It is anticipated that backfill for demolished building and structure foundations will be sourced from onsite demolition activities. If additional clean fill is needed, it could be obtained from onsite within or beyond the operational area. Prior to excavating backfill outside of the operational area, TMI-2 Solutions will evaluate the area's archaeological sensitivity and implement its protocols that will have been developed for the project to ensure continued stewardship of cultural resources on Three Mile Island.

Use of explosives for demolition of the natural draft cooling towers is anticipated and will be in accordance with applicable PA DEP regulations (25 Pa. Code §211) and best management practices and will seek to minimize the generation of fugitive dust, avoiding possible adverse effects to historic properties. PA DEP regulations for use of explosives also limit peak particle velocities to minimize ground vibration that could damage structures. Demolition of the natural draft cooling towers will be performed in accordance with regulatory limits, but also by use of innovative techniques that will be carefully planned, reviewed and executed under controlled conditions. The collapse of the towers is not expected to adversely affect currently identified historic properties.

Based on the findings discussed above, TMI-2 Solutions concludes that impacts of TMI-2 decommissioning to cultural, historical, and archaeological resources, including those from possible excavation of fill material within the TMINS boundaries but outside of the operational area, are large and that environmental impacts will be clearly noticeable and sufficient to destabilize important attributes of the resource.

6.1.15 Aesthetic Issues

In Section 4.3.15 of the GEIS, the NRC singles out structure dismantlement and entombment as the only activities that may have impacts on aesthetic resources. The aesthetic impacts of decommissioning fall into two categories: (a) impacts, such as noise, associated with decommissioning activities that are temporary and cease when decommissioning is complete and (b) the changed appearance of the site when decommissioning is complete. NRC drew the generic conclusion that for all plants, the potential impacts from decommissioning on aesthetics are small and that the removal of structures is generally considered beneficial to the aesthetics of the site.

During TMI-2 decommissioning, the impact of noise and dust would be temporary and

controlled to minimize impacts. The appearance of TMI-2 will be altered as the buildings and structures are dismantled. There are clear views of the plant from the Susquehanna River and of the taller structures from the mainland. The visual intrusion during dismantlement would be temporary and would serve to reduce the aesthetic impact of the site. Therefore, TMI-2 Solutions concludes that the impacts of TMI-2 decommissioning on aesthetics are small and generally considered beneficial. Thus, such impacts are bounded by the analysis in the GEIS.

6.1.16 Noise

Section 4.3.16 of the GEIS generically examined noise during decommissioning, concluding that noise impacts would be small.

Decommissioning activities would be comparable to the initial construction of the plant. Section 4.3 of the operations phase Environmental Report (ER) for TMI-2 (Reference 34) characterizes the construction activity as normal sounds from heavy equipment and the work accompanying a large construction project. The ER notes that the remote location of the site minimizes the effect of noise on the public.

NRC also considered the higher noise levels of demolition methods including use of pneumatic drills or explosives and concluded that environmental effects may be minimized by proper scheduling due to the short duration and isolated use of such methods. The consideration of these higher noise activities in Section O.1.4 of the GEIS did not alter NRC's conclusion that it is unlikely that the noise associated with most decommissioning activities will be of sufficient strength to be environmentally detectable or to destabilize the environment. In addition, PADEP has established regulatory limits for airblast (i.e., audible and in-audible airborne vibration energy) from the use of explosives, requires a PADEP-issued permit for blasting, and requires that blasting activities take place under the control of licensed personnel.

Decommissioning activities will be primarily limited to previously disturbed land surrounding the power block and isolated from both wildlife and members of the public. The noise levels associated with the decommissioning activities are not expected to be any more severe than during the initial construction of the station or refueling outages and are not expected to present an audible intrusion on the surrounding community and environment. Higher noise levels may occur during the demolition of the cooling towers, but that activity will be limited in duration.

Therefore, because TMI-2 decommissioning activities are of the type previously considered by NRC and TMI-2 has no site-specific conditions that would alter the NRC's prior findings, TMI-2 Solutions concludes that the noise impacts from decommissioning activities would be small and thus bounded by the analysis in the GEIS.

6.1.17 Transportation

In Section 4.3.17 of the GEIS, NRC states that its "...regulations are adequate to protect the public against unreasonable risk from the transportation of radioactive materials."

Therefore, the effects of transportation of radioactive waste on public health and safety are considered to be neither detectable nor destabilizing. TMI-2 will comply with NRC and Department of Transportation regulations for shipments of radioactive waste from TMI-2 decommissioning.

The GEIS analyzes radiological shipments of waste from decommissioning and calculates incident-free doses and latent cancer fatalities to crew, the public along the route, and onlookers. The GEIS also calculates the collective dose for radiological accidents during transportation. The calculated impacts are closely related to the distance shipped, volumes shipped, and activity levels. The estimated volumes of LLRW associated with TMI-2 decommissioning are summarized in Table 6-2 using waste types from the GEIS.

TABLE 6-2
Estimated Radioactive Waste Associated with TMI-2 Decommissioning

Waste Class	Volume (cf)
Class A	4,200,000
Class B & C	17,000

Class A wastes will be shipped to the Energy*Solutions* disposal site in Utah and Class B and C wastes will be shipped to the Waste Control Specialists facility in Andrews, Texas. Approximately 99% of all wastes will be shipped to the disposal site via rail. As stated in the GEIS "shipment of spent fuel by rail reduces the radiological impacts significantly (more than a factor of 10 for shipments from the northeast to Nevada). Similar reductions would be expected in the radiological impacts of the shipment of LLW from decommissioning if shipments were made by rail rather than by truck."

If radiological impacts alone are considered, the conclusions in the GEIS would bound the impacts of transportation of radioactive waste from TMI-2 decommissioning. The TMI-2 waste shipments would travel shorter distances than were analyzed in the GEIS. For TMI-2, the volumes would be lower for both high-activity and low-activity waste than the waste volumes NRC considered in the GEIS analysis.

Section 4.3.17 of the GEIS recognizes non-radiological impacts of transportation to include increased traffic, wear and tear on area roadways, and increased traffic accidents from both radiological and non-radiological transport, including that for hazardous waste. NRC concluded that transporting materials to and from a decommissioning site would not significantly impact the overall traffic volume or compromise the safety of the public. TMI-2 's waste shipments are not expected to be large enough in number to have a detectable or destabilizing effect on traffic flow or road wear. The number of workers during the decommissioning phases is expected to be below the number of temporary workers supporting Exelon during TMI-1 refueling outages as noted in Section 6.1.12. Consequently, challenges to the existing

transportation infrastructure are not expected. Furthermore, the combination of radioactive shipments, non-radioactive shipments, and other transportation will occur over an extended time and will not result in significant changes to public safety or the transportation infrastructure.

The GEIS concludes that both non-radiological and radiological impacts of decommissioning transportation are small. No unique features or site-specific conditions are present at TMI-2 that would alter these NRC prior findings. Therefore, TMI-2 Solutions concludes that transportation impacts of TMI-2 decommissioning are small and thus bounded by the analysis in the GEIS.

6.1.18 Irreversible and Irretrievable Commitment of Resources

Section 4.3.18 of the GEIS generically concluded that the impacts of decommissioning on irreversible and irretrievable commitments of resources are small. Given that TMI-2 would be decommissioned to radiological standards for unrestricted release, the land will be available for other uses. Furthermore, the materials and fuel consumed during TMI-2 decommissioning would be minor. The decommissioning of TMI-2 would generate radioactive waste and non-radiological waste requiring land disposal. Land devoted to radioactive waste disposal sites or industrial landfills was not within the scope of the GEIS because such commitments are addressed in the licensing documents for the disposal sites. Therefore, TMI-2 Solutions concludes that the impacts of TMI-2 decommissioning on irreversible and irretrievable commitments of resources would be small and thus bounded by the analysis in the GEIS.

6.2 Environmental Impacts of License Termination

A license termination plan (LTP) for TMI-2 will be developed and submitted to the NRC approximately two years prior to the anticipated license termination date. The LTP will include a supplemental review of environmental impacts describing any new information or significant environmental change associated with the proposed termination activities. Although the LTP, including a supplemental environmental review, need not be prepared and submitted until a minimum of two years prior to the anticipated license termination date, as required by 10 CFR 50.82(a)(9), the absence of any unique site-specific factors, significant groundwater contamination, unusual demographics, or impediments to achieving unrestricted release indicate that impacts resulting from TMI-2 license termination will be similar to those evaluated in NUREG-1496 (Reference 18).

6.3 Additional Considerations

The following considerations are relevant to concluding that TMI-2 decommissioning activities prior to license termination will not result in significant environmental impacts not previously reviewed:

- Continued compliance with radiological release and dose regulatory limits and adherence to plant procedures for monitoring.

- Continued site access control to minimize or eliminate radiation release pathways to the public.
- Transport of radioactive waste in accordance with plant procedures, applicable Federal regulations, and the requirements of the receiving facility.
- Continued adherence to ALARA principles during decommissioning and compliance with occupational dose limits.
- Continued compliance with applicable regulations and permit conditions.
- Continued storage of Debris Material in accordance with license conditions and plant procedures

The following considerations are also relevant to concluding that decommissioning activities will not result in significant environmental impacts not previously reviewed.

- Significant cleanup of the TMI-2 facility has already been completed with approximately 99% of the fuel debris removed and shipped to INEEL.
- Radiation protection techniques and technology have advanced since the plant entered PDMS in 1993 and are expected to significantly reduce occupational exposure.

6.4 Conclusion

TMI-2 Solutions has performed an environmental review to evaluate environmental impacts associated with decommissioning activities; confirming that the anticipated or potential impacts are within the bounds of the NRC prepared PEIS (References 6,7, 8, and 9) during Phase 1b as well as the generic impacts that NRC described in the GEIS (Reference 11).

This evaluation indicates that TMI-2 decommissioning activities fall within the range of decommissioning activities considered by NRC in the PEIS and GEIS. There are no unique aspects of the plant or the expected decommissioning techniques that would invalidate the conclusions of the PEIS or GEIS. The evaluation indicates that the impacts of TMI-2 decommissioning are bounded by the GEIS's assessment for those environmental issues for which NRC made generic determinations. For the areas where a site-specific assessment was required, the anticipated impacts from TMI-2 decommissioning were determined to be small and bounded by the plant's FES with the exception of the cultural, historical, and archaeological resources which is classified as large as discussed in Section 6.1.14. In addition, after decommissioning plans mature and before decommissioning activities occur that either could be potentially impactful to an environmental resource for which a site-specific assessment was required or would be otherwise inconsistent with those actions or activities described in the PSDAR, TMI-2 Solutions will notify the NRC in writing and seek appropriate environmental review in accordance with applicable NRC regulations.

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ATTACHMENT 1 TO TMI2-RA-COR-2021-0004

ENCLOSURE 1B
DETAILED COST AND SCHEDULE INFORMATION

(NON-PROPRIETARY INFORMATION)

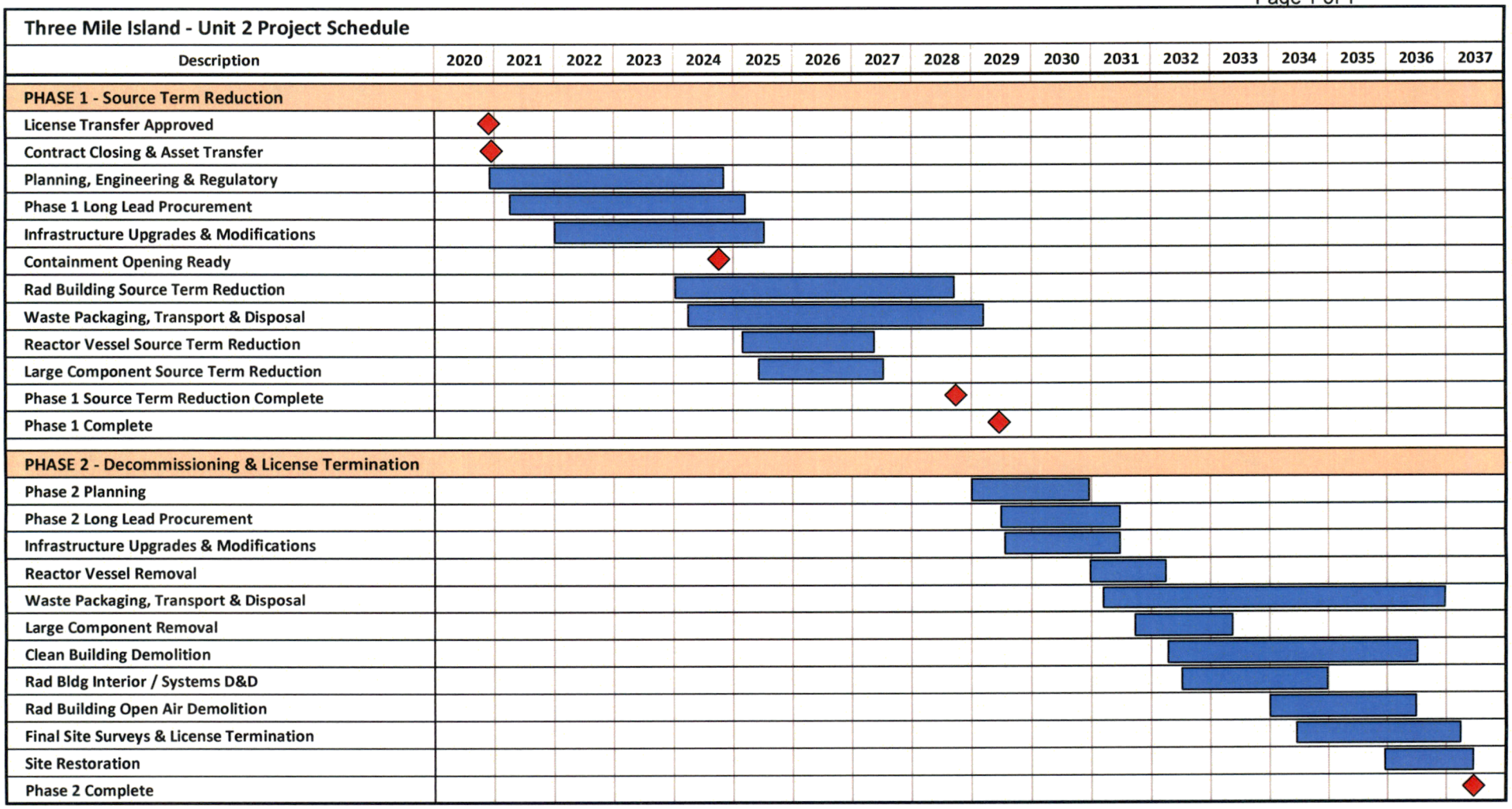
THREE MILE ISLAND NUCLEAR POWER STATION, UNIT 2

NRC POSSESSION ONLY LICENSE NO. DPR-73

TABLE 1B-1

Three Mile Island Unit 2 Estimated Annual Spending (thousands of 2020 Dollars)				
Year	License Termination	Debris Material	Site Restoration	Total
2019				-
2020	8,502			8,502
2021	29,148	2,270		31,418
2022	48,166	3,488		51,654
2023	59,240	11,849		71,089
2024	69,610	9,157		78,767
2025	69,799	8,286		78,085
2026	67,252	11,187		78,439
2027	53,600	11,187		64,787
2028	51,555	4,497		56,052
2029	31,233			31,233
2030	32,272			32,272
2031	46,086		332	46,418
2032	52,238		5,456	57,694
2033	58,633		6,246	64,879
2034	100,010		5,864	105,874
2035	101,162		7,147	108,309
2036	79,500		3,212	82,712
2037	11,355		1,642	12,997
2038				-
2039				-
2040				-
Total	969,362	61,921	29,899	1,061,181

FIGURE 1B-1


Three Mile Island - Unit 2 Project Schedule
Description
2020
2021
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2023
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2031
2032
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2034
2035
2036
2037
PHASE 1 - Source Term Reduction
License Transfer Approved
Contract Closing & Asset Transfer
Planning, Engineering & Regulatory
Phase 1 Long Lead Procurement
Infrastructure Upgrades & Modifications
Containment Opening Ready
Rad Building Source Term Reduction
Waste Packaging, Transport & Disposal
Reactor Vessel Source Term Reduction
Large Component Source Term Reduction
Phase 1 Source Term Reduction Complete
Phase 1 Complete
PHASE 2 - Decommissioning & License Termination
Phase 2 Planning
Phase 2 Long Lead Procurement
Infrastructure Upgrades & Modifications
Reactor Vessel Removal
Waste Packaging, Transport & Disposal
Large Component Removal
Clean Building Demolition
Rad Bldg Interior / Systems D&D
Rad Building Open Air Demolition
Final Site Surveys & License Termination
Site Restoration
Phase 2 Complete

ATTACHMENT 3 TO TMI2-RA-COR-2021-0004

LIST OF REGULATORY COMMITMENTS

THREE MILE ISLAND NUCLEAR POWER STATION, UNIT 2

NRC POSSESSION ONLY LICENSE NO. DPR-73

The following list identifies those actions committed to by TMI-2 Solutions in this letter and Attachment 1 ("Three Mile Island Nuclear Power Station, Unit 2 Post-Shutdown Decommissioning Activities Report"). Any other actions discussed in the submittal represent intended or planned actions by TMI-2 Solutions. They are described only as information and are not Regulatory Commitments. Please notify Gerry van Noordennen, Senior Vice President, Regulatory Affairs, TMI-2 Solutions, at 860-462-9707 of any questions regarding this document or associated Regulatory Commitments.

REGULATORY COMMITMENT	TYPE		SCHEDULED COMPLETION DATE
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
A waste management plan will be developed consistent with regulatory requirements and disposal/processing options for each waste type at the time of the D&D activities.	X		Prior to generating waste from Major D&D activities
As part of the site characterization process, a neutron activation analysis calculation study of the reactor internals and the reactor vessel will be performed.	X		Prior to removal, segmentation, packaging and disposal of RV/RVI
The Groundwater Protection Program will continue for TMI-2 in accordance with NEI Technical Report 07-07 during decommissioning.		X	Until replaced by the LTP groundwater monitoring program
TMI-2 Solutions will notify the NRC in writing and seek appropriate environmental review in accordance with applicable NRC regulations before decommissioning activities occur that could significantly impact the environmental resource, as needed.		X	As needed
TMI-2 will update the site-specific assessment of environmental impacts to protected species in the PSDAR as needed. To comply with its continuing obligation under 10CFR 50.82(a)(6) to assure that no decommissioning activity that would result in significant environmental impacts would be performed without NRC review, the results of the assessment would be provided to the NRC in accordance with applicable NRC regulations.		X	As needed

REGULATORY COMMITMENT	TYPE		SCHEDULED COMPLETION DATE
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
If the peregrine falcons continue to nest on the TMI-2 Reactor Building during the falcon nesting season, TMI-2 Solutions plans to contract with specialists prior to building demolition to determine the most feasible method to prevent the falcons from nesting on the structure without harming them and attempt to relocate their nesting site.		X	Prior to demolishing structures coinciding with falcon nesting season
TMI-2 Solutions will consult with state and federal resource agencies before Major decommissioning activities in water commence to ensure that no listed aquatic species has been discovered in the intervening years and that no species previously documented in Lake Frederic has, in the intervening years, been afforded state or federal protection.		X	Prior to performing Major decommissioning activities in water
TMI-2 Solutions will consult with appropriate state and federal resource agencies when a decision is reached on timing and method of cooling tower removal to ensure that agency concerns are addressed.	X		Prior to cooling tower removal
TMI-2 Solutions will develop a Radiation Protection Program that addresses occupational dose administrative limits.	X		Prior to assuming RP program responsibilities from Exelon

ATTACHMENT 4 TO TMI2-RA-COR-2021-0004

CORRESPONDENCE WITH PENNSYLVANIA STATE HISTORIC PRESERVATION OFFICE

THREE MILE ISLAND NUCLEAR POWER STATION, UNIT 2

NRC POSSESSION ONLY LICENSE NO. DPR-73

LETTERS

Letter TMI-2020-003 "Three Mile Island Nuclear Station Unit 2 Decommissioning Project; Request for Information on Historic and Archaeological Resources," dated September 24, 2020.

McLearen D.C. (Pennsylvania State Historic Preservation Office), dated October 26, 2020

TMI-2 *SOLUTIONS*

September 24, 2020

TMI2-2020-003

Andrea MacDonald
Deputy State Historic Preservation Officer
Pennsylvania Historical and Museum Commission
State Historic Preservation Office
Commonwealth Keystone Building, Second Floor
400 North Street
Harrisburg, PA 17120-0093

Subject: **Three Mile Island Nuclear Station Unit 2 Decommissioning Project; Request for Information on Historic and Archaeological Resources**

Dear Ms. MacDonald:

Three Mile Island Nuclear Station Unit 2 (TMI-2) is permanently shut down after experiencing a partial melt down on March 31, 1979. Following immediate emergency response, a 10-year cleanup effort safely dispositioned the plant into its current long-term storage condition, termed post-defueling monitored storage (PDMS). After 28 years in PDMS, the owners and U.S. Nuclear Regulatory Commission (NRC) license holder of TMI-2, GPU Nuclear, made a decision to sell the TMI-2 property to TMI-2 Solutions (a subsidiary of the parent company Energy*Solutions*) for dismantlement and decommissioning of the plant.

TMI-2 Solutions is preparing a Post-Shutdown Decommissioning Activities Report (PSDAR) for submittal to the NRC. Although the NRC's review of the PSDAR involves no federal action that would mandate NRC consultation with the Advisory Council on Historic Preservation (ACHP) pursuant to Section 106 of the NHPA (54 U.S.C. § 306108; 36 CFR 800.16(y)), the PSDAR must include an updated assessment of potential impacts of decommissioning on cultural, historical and archaeological resources. Accordingly, TMI-2 Solutions is preparing the required assessment in support of the TMI-2 PSDAR and the purpose of this letter is twofold: (1) to acknowledge that TMI-2 is a historic site and that cultural resources exist on Three Mile Island and (2) to request input from the State Historic Preservation Office (SHPO) regarding concerns that should be considered in the assessment.

The purpose of the TMI-2 decommissioning project is to dismantle the TMI-2 structures; therefore, TMI-2 Solutions recognizes that the environmental impact to this historic site cannot be avoided. As such, TMI-2 Solutions respectfully requests SHPO's guidance in this matter. As discussed during an August 28, 2020 conference call with your office, TMI-2 Solutions is prepared to initiate a National Historic Preservation Act Section 106 consultation, which will be part of the later formal consultation required by the NRC as part of its environmental review of the TMI-2 decommissioning project.

Enclosure 1 to this letter describes the TMI-2 decommissioning project and summarizes TMI-2 Solutions' updated review of cultural and historic resources in the site vicinity. As this assessment indicates, TMI-2 Solutions does not expect TMI-2 decommissioning activities to adversely affect cultural resources.

However, TMI-2 Solutions requests your review of the TMI-2 decommissioning project activities and would appreciate receiving your input by November 27, 2020, detailing any concerns you may have about the effects of TMI-2 decommissioning activities on cultural resources, or confirming that TMI-2 decommissioning activities are unlikely to adversely affect cultural resources. Receiving your input by November 27, 2020 will support our current PSDAR preparation schedule. TMI-2 Solutions will include a copy of this letter and your response with the TMI-2 PSDAR.

If you have any questions regarding this letter, please contact Kim Anthony at (562) 706-1553 or by email, kmanthony@energysolutions.com.

Sincerely,

Gerry van Noordennen
Senior Vice President, Regulatory Affairs
Energy*Solutions*

cc: Scott Baskett, TMI-2 Solutions
Greg Halnon, GPU Nuclear
Mike Lackey, Energy*Solutions*
Kim Anthony, TMI-2 Solutions

Enclosure 1: TMI-2 Project Description & Historic Resources Review

TMI-2 SOLUTIONS

Enclosure 1

TMI-2 Project Description & Historic Resources Review

Contents

TMI-2 Decommissioning Project Description and Summary of Cultural and Historic Resources Review

Three Mile Island (TMI) is located in the Susquehanna River in Dauphin County, Pennsylvania, and is one of the largest of a group of several islands in the river about 10 miles southeast of Harrisburg and approximately 2.5 miles south of Middletown. Three Mile Island Nuclear Station was comprised of two pressurized water reactors—TMI Unit 1 (TMI-1) reactor, which is owned by Exelon Generation Company, LLC (Exelon), has permanently ceased power operations; and TMI-2, which is owned by GPU Nuclear, Inc. (GPU Nuclear), and partially melted down in 1979.

The Three Mile Island Nuclear Station (TMINS) site encompasses approximately 440 acres including Three Mile Island and adjacent islands on the north end, a strip of land on the mainland along the eastern shore of the river, and the area on the eastern shore of Shelley Island that is within the exclusion area (a 2,000-foot radius from a point equidistant between the centers of the TMI-1 and TMI-2 reactor buildings). TMI-2 structures are located on the northern part of Three Mile Island. Undeveloped land on the island is found south of the TMINS facilities. Most of this undeveloped land lies below the 10-year flood level. The southern part of the island also contains wetlands formed from borrow pits created during construction of TMINS.

TMI-2 started commercial operations in 1978. On March 28, 1979, the TMI-2 reactor experienced an accident initiated by an interruption of water from the secondary feedwater pumps to the steam generators that remove heat from the reactor core.

After the March 1979 accident, approximately 99% of the fuel was removed and shipped to the Idaho National Engineering and Environmental Laboratory (now called Idaho National Laboratory) under the responsibility of the U.S. Department of Energy (DOE). Radioactive wastes from the major cleanup activities were either shipped offsite or packaged and staged for shipment offsite.

The quantity of fuel remaining at TMI-2 is a small fraction (~1%) of the initial fuel load. Additionally, large quantities of radioactive fission products released into various systems and structures were removed as part of waste processing activities. TMI-2 entered into a long-term, safe and stable storage condition termed post-defueling monitored storage (PDMS) in December 1993, where it remains. After 28 years in PDMS, TMI-2 is in the early planning stages of decommissioning.

In November 2019, GPU Nuclear, Metropolitan Edison Company, Jersey Central Power & Light Company, Pennsylvania Electric Company, and TMI-2 Solutions, LLC (TMI-2 Solutions) submitted an Application for Order Approving License Transfer and Conforming License Amendments for TMI-2 to the U.S. Nuclear Regulatory Commission (NRC). The application proposed to transfer the possession only license (POL) of TMI-2 from GPU Nuclear to TMI-2 Solutions. Upon approval of the application and transfer of the POL, TMI-2 Solutions will assume all authorities provided for and responsibilities under the POL, including possession, maintenance, and eventual decommissioning of TMI-2 and associated buildings and structures. The TMI-2 structures are intermingled with those of TMI-1; however, the decommissioning of TMI-2 and TMI-1 are independent actions.

In the Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities (NUREG-0586, Supplement 1) (Reference 1), Section 4.1.2, confinement of decommissioning activities to the "operational area" was considered to be a key discriminator for ecological and cultural impacts, with only small impacts expected to occur within the operational area. NUREG 0586 Supplement 1 defines the term "operational area" as follows:

"The operational area is defined as the portion of the plant site where most or all of the site activities occur, such as reactor operation, materials and equipment storage, parking, substation operation, facility service, and maintenance. This includes areas within the protected area fences, the intake, discharge, cooling, and associated structures as well as surrounding paved, graveled, maintained landscape, or other maintained areas."

Current planning anticipates that TMI-2 decommissioning activities will be limited to the TMI-2 operational area, except for the possible excavation of fill from onsite areas outside of the operational area to backfill the foundations of buildings and structures after demolition. Figure 1 depicts the TMINS site location and the approximate TMI-2 operational area boundary.

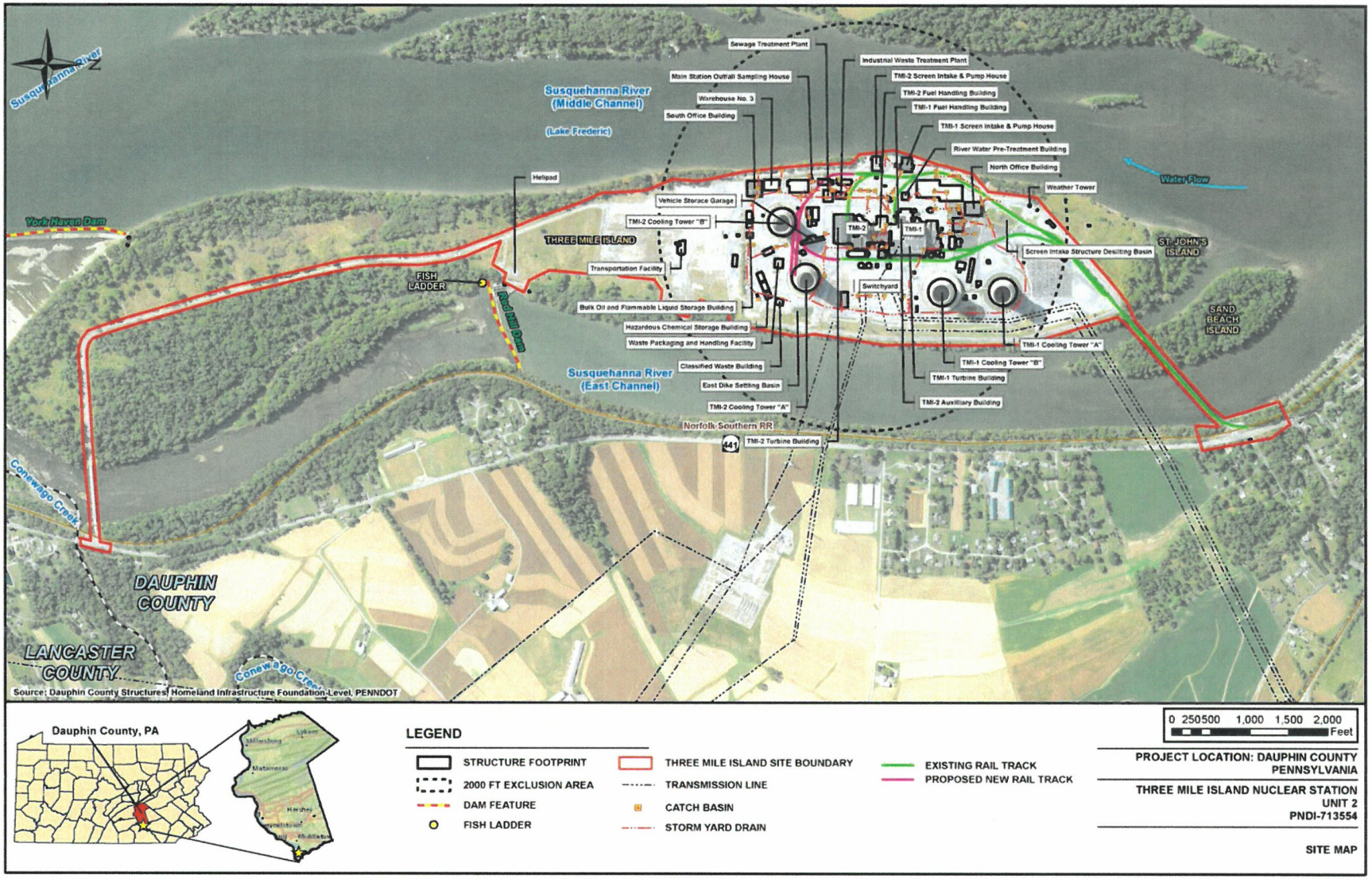


Figure 1. Three Mile Island Nuclear Station site location and approximate Unit 2 (TMI-2) operational area boundary outlined in red.

Identification of Historic and Archaeological Resources

Because TMI-1 and TMI-2 are located within the same operational area with virtually identical resources, TMI-2 Solutions benefits from previous historic and archaeological database searches. Referenced here is information provided by Exelon's TMI-1 PSDAR (Reference 2), which reports locations of inventoried resources on the island and within an approximately 6-mile radius. Data came from plant documentation and the Pennsylvania State Historic Preservation Office (PA SHPO).

One archaeological site within the TMI-1 and TMI-2 operational area (identified on the NRHP as 36DA50) is believed to remain intact. The site is north of the access road at the northern end of the operational area. Its eligibility for listing on the NRHP is categorized as undetermined due to insufficient information, presumably due to uncertainty about its current condition.

Six archaeological sites are located on the central and southern portions of Three Mile Island outside the TMI-1 and TMI-2 operational area but within the TMINS property boundary. In 2016, one of these archaeological sites (36DA 100) was determined to be eligible for the NRHP. That site is at the south end of the island near the South Access Road. Another archaeological site (36DA98) is immediately south of the operational area in a location used for staging and soil borrowing during construction of the station, and it was likely removed by those construction activities. A third site (36DA51) has been determined to be not eligible for listing, and three more sites (36DA99, 36DA 101, and 36DA235) are considered unevaluated due to insufficient information.

Beyond Three Mile Island operational area, but within a 6-mile radius, there are 13 properties currently listed on the NRHP and 32 NRHP-eligible properties. One property, a section of the Pennsylvania Railroad Main Line linear historic district, lies 0.4 miles away from TMI-1 and TMI-2 and the remaining properties are more than 1 mile away. These properties are listed in Table 1 of Reference 4.

As a specific update to Exelon's 2019 review, TMI-2 Solutions is aware that in 2010, TMI-2 was classified as a historic structure eligible for listing on the National Register of Historic Places (NRHP) (Reference 3). The Cultural Resources Geographic Information System (CRGIS) Report is included herein as Attachment 1. Furthermore, the Historic Resources Survey Form (Attachment 2) provides a historical evaluation of the TMI-2 accident.

Decommissioning Activities and Mitigation

TMI-2 Solutions will develop a Cultural Resources Protection Plan and an Archaeological Resources Erosion Monitoring Plan, which will provide protocols for ensuring continued stewardship of cultural resources on Three Mile Island during the TMI-2 decommissioning project. In addition, project-specific policies and procedures will provide direction and contact information should an unanticipated cultural resource be encountered.

It is anticipated that backfill for demolished building and structure foundations will be sourced from onsite demolition activities. If additional clean fill is needed, it could be obtained from onsite within or beyond the operational area. Prior to excavating backfill outside of the operational area, TMI-2 Solutions will evaluate the area's archaeological sensitivity and implement its protocols that will have been developed for

the project to ensure continued stewardship of cultural resources on Three Mile Island. Again, should an unanticipated discovery be made, TMI-2 Solutions procedures will be in place to address how a discovery should be managed.

Use of explosives for demolition of the natural draft cooling towers is anticipated and will be in accordance with applicable PA DEP regulations (25 Pa. Code §211) and best management practices and will seek to minimize the generation of fugitive dust, avoiding possible adverse effects to historic properties. The PA DEP regulations for use of explosives also limit peak particle velocities to minimize ground vibration that could damage structures. Demolition of the natural draft cooling towers will be performed in accordance with regulatory limits, but also by use of innovative techniques that will be carefully planned, reviewed and executed under controlled conditions. The collapse of the towers is not expected to adversely affect currently identified historic properties.

Attachments

Attachment 1: Cultural Resources Geographic Information System Report (CRGIS)
Attachment 2: Historic Resource Survey Form. Pennsylvanian Historical and Museum Commission, Bureau for Historic Preservation

References

1. U.S. Nuclear Regulatory Commission. 2002. Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, NUREG-0586, Supplement 1, Office of Nuclear Reactor Regulation, Washington, D.C., dated November 2002 (ADAMS Accession Nos. ML023470304 (Vol 1) and ML023470323 (Vol 2))

2. Exelon Generation. 2019. Three Mile Island Nuclear Station, Unit 1 – Post-Shutdown Decommissioning Activities Report (ADAMS Accession No. ML19095A041)

3. Pennsylvania State Historic Preservation Office, 2018, "Cultural Resources Geographic Information System [CRGIS]," Available at https://gis.penndot.gov/CRGIS, Accessed September 16, 2020

4. Exelon. 2019. Three Mile Island Nuclear Station Unit 1 Decommissioning, Request for Information on Historic and Archaeological Resources (Letter to PA State Historic Preservation Office, dated January 17, 2019)

Attachment 1

Historic Resource Information

Historic Resource Information

Identification

Key #: 156047
Property Name: Three Mile Island: Unit 2; TMI Unit 2
Resource Type: District
Approximate # of Resources: 5

Location

Dauphin County: Londonderry Township
Address: route 441 ,

Status

NR Status: SHPO: Eligible
Owner: Private
Condition: Unreported

Historic Information

Year Built: 1969
Associated Event: Three Mile Island Partial Meltdown

Physical Description

Style: No Style
Walls: Concrete

Historic Function

Function	Sub Function	Particular Use
Industry/Processing/Extract	Energy Facility	Nuclear power reactor

Current Function

Function	Sub Function	Particular Use
Vacant/Not In use		

Inventory Items

No Data Present

Ancillary Features

No Data Present

Associated Resources

Resource	Name	Association
079154	Three Mile Island	Historically Associated

Administrative Actions

Historic Resource Information

06/24/2019: Date Record Updated
06/18/2018: Date Record Updated
03/18/2010: SHPO: Eligible
02/25/2010: SHPO Staff Meeting
02/25/2010: SHPO Staff Meeting
02/17/2010: SHPO Site Visit

National Register Information

Acreage: 12.3

Attachments

Attachment	Name
Form	H156047_134791_D.pdf

Comments

No Data Present

Outbuildings

No Data Present

Observations

No Data Present

Attachment 2

Historic Resource Survey Form

Historic Resource Survey Form

PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION
Bureau for Historic Preservation

ER# _____ Key # 156047

Name, Location and Ownership *(Items 1-6; see Instructions, page 4)*

HISTORIC NAME Three Mile Island Unit 2; TMI-Unit 2

CURRENT/COMMON NAME Three Mile Island-Unit 2; TMI-Unit 2

STREET ADDRESS Route 441 **ZIP** 17057

LOCATION Susquehanna River, 10 miles south of Harrisburg

MUNICIPALITY Londonderry Township **COUNTY** Dauphin

TAX PARCEL #/YEAR _____ **USGS QUAD** _____

OWNERSHIP X **Private**

☐ **Public/Local** ☐ **Public/County** ☐ **Public/State** ☐ **Public/Federal**

OWNER NAME/ADDRESS FirstEnergy Corporation owns TMI2

CATEGORY OF PROPERTY ☐ **Building** ☐ **Site** ☐ **Structure** ☐ **Object** XX **District**

TOTAL NUMBER OF RESOURCES 5

Mailing address for TMI
Exelon Corp
PO Box 480
Middletown PA 17057

Function *(Items 7-8; see Instructions, pages 4-6)*

Historic Function	Subcategory	Particular Type
Industry/Processing/Extraction	Energy Facility	Nuclear power reactor
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Current Function	Subcategory	Particular Type
Vacant/not in use	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Architectural/Property Information *(Items 9-14; see Instructions, pages 6-7)*

ARCHITECTURAL CLASSIFICATION

Other	_____
_____	_____
_____	_____

EXTERIOR MATERIALS and STRUCTURAL SYSTEM

Foundation	_____	_____
Walls	Concrete	_____
Roof	_____	_____
Other	_____	_____
Structural System	_____	_____

WIDTH _____(feet) or _____ (# bays) **DEPTH** _____(feet) or _____ (# rooms) **STORIES/HEIGHT** 190 feet

Key # [redacted]

ER# _____

Property Features *(Items 15-17; see Instructions, pages 7-8)*

Setting Industrial and natural landscape

Ancillary Features

____	____	____
____	____	____
____	____	____

Acreage 12.3 (round to nearest tenth)

Historical Information *(Items 18-21; see Instructions, page 8)*

Year Construction Began 1969 ☐ Circa **Year Completed** ____ ☐ Circa

Date of Major Additions, Alterations ____ ☐ Circa ____ ☐ Circa ____ ☐ Circa

Basis for Dating X Documentary ☐ Physical

Explain Corporation records and NEC state this is the construction date

Cultural/Ethnic Affiliation(s) ____

Associated Individual(s) ____

Associated Event(s) Three Mile Island Partial Meltdown

Architect(s) ____

Builder(s) ____

Submission Information *(Items 22-23; see Instructions, page 8)*

Previous Survey/Determinations Not Eligible – July 25, 1983 - SHPO

Threats XX None ☐ Neglect ☐ Public Development ☐ Private Development ☐ Other

Explain ____

This submission is related to a ☐ non-profit grant application ☐ business tax incentive ☐ NHPA/PA History Code Project Review ☐ other

Preparer Information *(Items 24-30; see Instructions, page 9)*

Name & Title Cheryl L. Nagle, Historic Preservation Specialist

Date Prepared December 2009 – February 2010 **Project Name** TMI – Unit 2

Organization/Company PHMC

Mailing Address 400 North Street, Harrisburg PA 17120

Phone 717-772-4519 **Email** chnagle@state.pa.us

Key # [redacted]

ER#

National Register Evaluation *(Item 31; see Instructions, page 9)*

(To be completed by Survey Director, Agency Consultant, or for Project Reviews ONLY.)

☐ Not Eligible (due to ☐ lack of significance and/or ☐ lack of integrity)

X Eligible Area(s) of Significance Industry

Criteria Considerations G Period of Significance March 28, 1979-April 4, 1979

☐ Contributes to Potential or Eligible District District Name _____

Bibliography *(Item 32; cite major references consulted. Attach additional page if needed. See Instructions, page 9.)*

See Attached

Additional Information

The following must be submitted with form. Check the appropriate box as each piece is completed and attach to form with paperclip.

☐ Narrative Sheets—Description/Integrity and History/Significance (See Instructions, pages 13-14)

☐ Current Photos (See Instructions, page 10)

☐ Photo List (See Instructions, page 11)

☐ Site Map (sketch site map on 8.5x11 page; include North arrow, approximate scale; label all resources, street names, and geographic features; show exterior photo locations; See Instructions, page 11)

☐ Floor Plan (sketch main building plans on 8.5x11 page; include North arrow, scale bar or length/width dimensions; label rooms; show interior photo locations; See Instructions, page 11)

☐ USGS Map (submit original, photocopy, or download from TopoZone.com; See Instructions, page 12)

Photo List (Item 33)

Key # [redacted]

ER#

Photographer name Cheryl L. Nagle

Date February 17, 2010

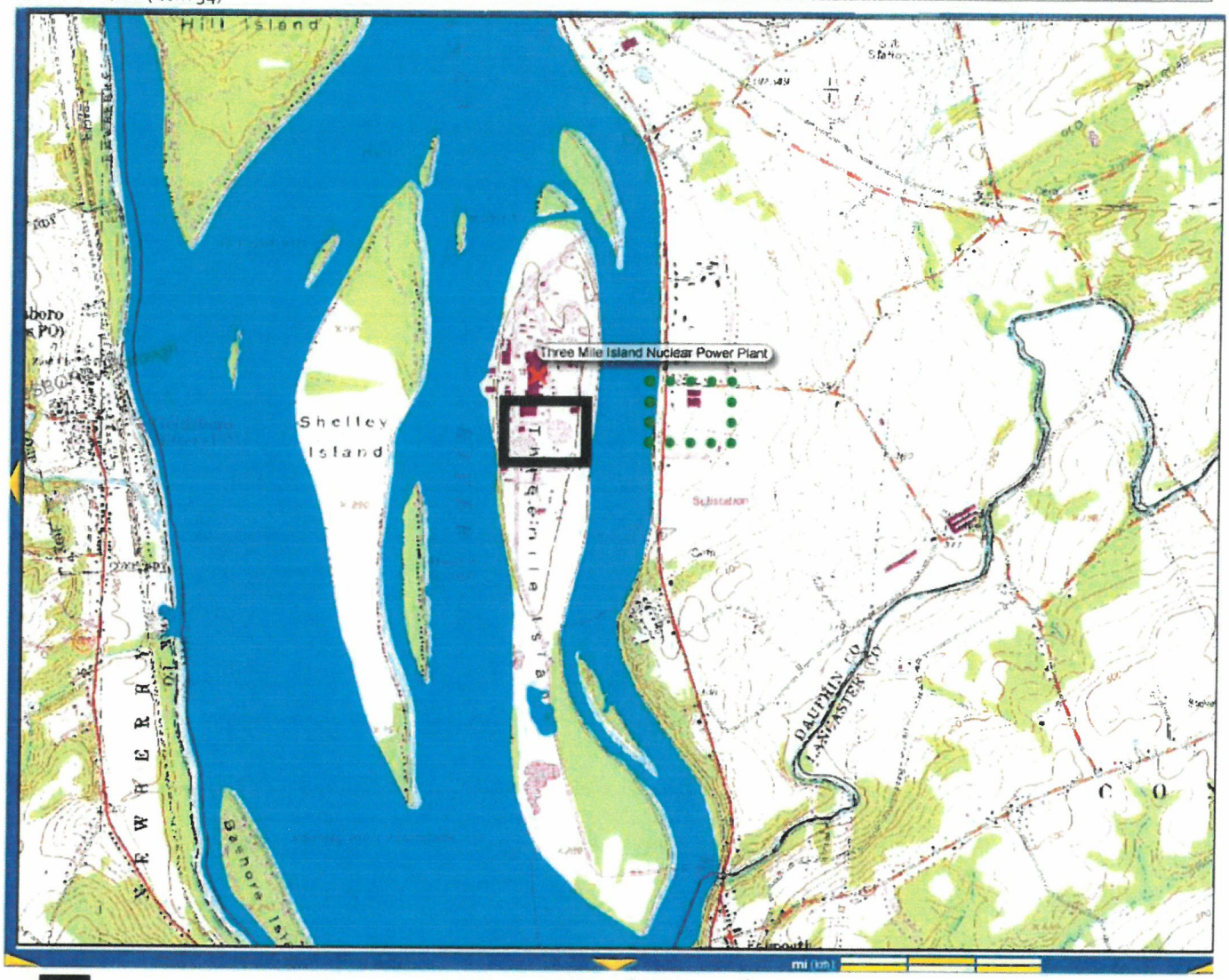
Location Negatives/Electronic Images Stored PHMC, N:drive

Photo #	Photo Subject/Description	Camera Facing
1	Basement of Turbine Building	
2	Basement of Turbine Building, Showing Condensers	
3	Condensate Vessels	
4	Condensate Pump Heads	
5	Unit Substation	
6	First Floor of Turbine Building	
7	Second Floor of Turbine Building, Showing Generator Top	
8	Second Floor of Turbine Building, Showing Turbine	
9	Auxiliary Building	
10	Unit 2, Cooling Tower A from roof of Turbine Building	
11	Unite 2, Cooling Tower B from roof of Turbine Building	
12	Feed Water Pumps	
13	Unit 2 Control Room	
14	Unit 2 Control Room	
15	Unit 2 Control Room	
16	Unit 2 Control Room	
17	"Valve Open" light on control panel in Unit 2 Control Room	

Key # [redacted]

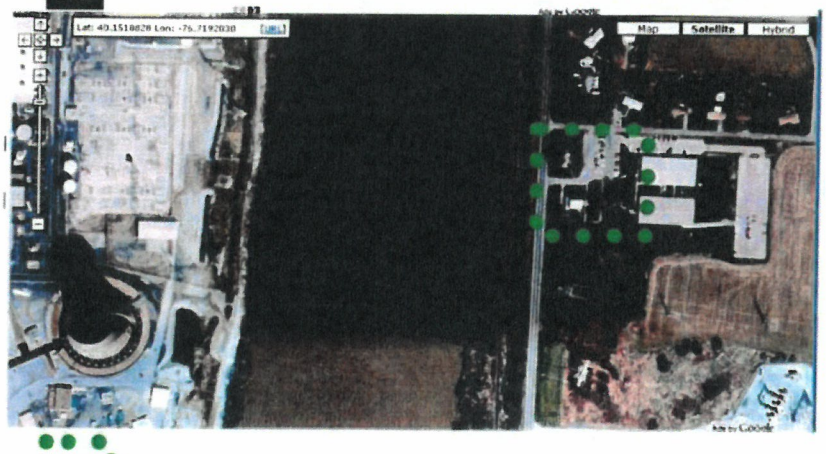
ER# _____

Site Plan (Item 34)



Three Mile Island, Unit 2

NR boundary



← not included in boundary

Three Mile Island, Visitor Center

Recent (1990s-2000s) Aerial of Three Mile Island

Aerial of Three Mile Island, 10 April 1979
ACR Identifier 540012; The National Archives

Key #_____

ER#_____

Physical Description and Integrity (Item 38)

Due to Homeland Security issues, portions of this HRSF may need to be redacted after it has been evaluated for National Register eligibility (Note: this only includes the two site plans obtained from ER File 2007-1737-043). Any data, plans or photographs which have been obtained from various Internet sources or books, will remain in the HRSF, for they have been previously published for public consumption. The preparer received verbal approval to take pictures on the February 17, 2010 field view and to publish them within this HRSF. Pertinent background information in regards to the complete site and TMI-Unit 1 will be included when necessary for context. The generating station will be referred to as TMI, and the reactor units respectively as TMI-Unit 1 and TMI-Unit 2.

Three Mile Island Nuclear Generating Station (TMI) is located in Londonderry Township, Dauphin County, Pennsylvania, approximately 10 miles southeast of Harrisburg. The station is built on an island in the Susquehanna River, in the center of the Susquehanna River basin, consisting of 370 acres, of which approximately 200 acres are occupied by the Three Mile Island Unit-1 (TMI-Unit 1) and Three Mile Island Unit-2 (TMI-Unit 2) facilities.[1] The remaining 170 acres are covered by fields, forested land, and wetlands with several intermittent ponds. Depending on the source, the name is either derived from the size of the island (three miles long) or the fact that TMI is located three miles downriver from Middletown, Pennsylvania. TMI-Unit 2 occupies approximately 12.3 acres.

The island contains prehistoric and historic Native American and Euro-American cultural resources; PHMC site file records include Sites 36DA0051, 36DA0098, 36DA0096, 36DA0097, 36DA0099, 36DA0052, 36DA0050, 36DA0235, 36DA0100, 36DA0101. The utility company, Metropolitan Edison purchased the Three Mile Island and adjacent islands in 1924 from the York Haven Power and Water Company. York Haven had purchased Three Mile Island from James Duffy in 1904, who until then had a tobacco plantation on the island. During the twentieth century, the land was leased to farmers. Between "1957 and the start of construction [TMI], 270 acres of land was leased on the island for farming of corn and tomatoes. The island hosted 70 cabins, picnic facilities, two fireplaces, two restrooms, a drinking water well, and a boat ramp. No access roads or bridges were connected to the island. All access was by boat or barge. No electrical service was supplied to the island."[2]

TMI is a nuclear generating station, which when finished, contained two reactors.[3] There were two cores, two turbine systems, and two sets of cooling towers; and each unit had a separate control room; in addition there were numerous outbuildings that either unit shared or used separately. TMI-Units 1 and 2 shared the Station Blackout Diesel Generator Building (extant) and Fuel Handling Building (extant)

---

[1]TMI-Unit 1 site encompasses several properties that total approximately 440 acres, including the physical plant location on 200 acres of the 370-acre Three Mile Island; St. John's Island and Evergreen Island, together totaling 31 acres; a 6.4 acre section of Shelley Island, which is part of the western half of the TMI-1 Exclusion Area; and a 32-acre strip of and east of Three Mile Island along the eastern shore of the Susquehanna River.

[2]United States Atomic Energy Commission, "Final Environmental Impact Statement for Three Mile Island," 1972.

[3] "A nuclear reactor uses nuclear fission to generate heat to boil water and power steam turbines. Nuclear reactors are characterized as light-water or heavy-water units. Two types of light-water reactors are in widespread use: the boiling-water reactor (BWR) and the pressurized-water reactor (PWR). Both use similar fuel, consisting of long bundles of 2 to 4 percent uranium dioxide fuel pellets stacked in zirconium-alloy cladding tubes. The PWR is a two-loop system that uses high pressure to maintain an all-liquid-water primary loop. Energy is transferred to the secondary steam loop through two to four steam generators." Douglas C. McVarish, *American Industrial Archaeology: A Field Guide* (Walnut Creek, CA: 2008), 182.

Metropolitan Edison, a subsidiary of General Public Utilities, began construction of TMI-1 in 1968. TMI-Unit 1 is a pressurized water reactor, designed by Babcock and Wilcox, built by United Engineers and Constructors, with Gilbert Associates as the design engineers, with a net generating capacity of 850 MWe. TMI-Unit 1 came online on April 19, 1974, and began commercial operation on September 2, 1974. It utilizes two hyperbolic natural draft cooling towers for dissipating heat from the plant steam cycle.

Metropolitan Edison, a subsidiary of General Public Utilities, began construction of TMI-Unit 2 in 1969. TMI-Unit 2 was a pressurized water reactor designed by Babcock and Wilcox, built by United Engineers and Constructors, with Burns and Roe as design engineers, with a net generating capacity of 906MWe. The unit received its operating license on February 8, 1978 and began commercial operation on December 30, 1978. TMI Unit-2 facilities included the following:

Two 370-foot tall concrete cylindrical Natural Draft cooling towers (extant)

Concrete control room with bullet-proof windows, reinforced steel doors and a horseshoe-shaped panel which stretches 40 feet along three walls (extant)

Turbine (electric power generating) building (extant)

Cylindrical, domed concrete 190-foot-high reactor building, also known as the containment building (extant)

Concrete fuel handling building (extant)

Water pretreatment building (not extant).

The two units of the Three Mile Island nuclear power plant from the southeast.
Source: Nuclear Regulatory Commission Special Inquiry Group,
"Three Mile Island, A Report to the Commissioners and to the Public," Volume 1, 1980.

The Visitors' Center (extant), where MetEd conducted the news conferences was located across the street on the corner of PA Route 441 (River Road) and Pecks Road; the Three Mile Island Training Center, which contains a simulator room, is currently located directly behind the center's building. The Visitors' Center is no longer open to the public.

Boundaries

While the accident occurred at TMI, which houses both TMI-Unit 1 and TMI-Unit 2 and their auxiliary buildings, and the site itself continues to function in its original capacity as an energy facility, the resource and its subsequent boundary is only the TMI-Unit 2 and its specifically designated auxiliary buildings.

Integrity

CW 2/22/10 delete

TMI-Unit 2 as a district retains exceptional integrity, for it has been in non-operating status since the accident. While between 1985 and 1990 an extensive program to defuel the reactor vessel and decontaminate the facility occurred (it included the removal of some 100 metric tons of damaged uranium fuel and 50 metric tons of damaged structural material from the reactor pressure vessel and the removal of the top layer of contaminated concrete inside the containment building), and the unit was placed in post-defueling monitored storage (which is "a safe, inherently stable condition") in December 1993, no significant dismantlement has occurred.[4]

The significance of the TMI-Unit 2 district is reflected by its integrity of location, setting, feeling, association, materials, and design. The district retains integrity of location, as it is the location of the nuclear generating station where the event occurred. The district retains integrity of setting, for not only do the buildings and infrastructure remain, the physical environment surrounding the unit remains intact since the facility is still operating as a nuclear plant.

The district retains integrity of association, which is the direct link between an important historic event and a historic property. The TMI-Unit 2 was the place where the event and activity took place. The physical features in this district have structural, functional, and material integrity and retain their quality of association with the events of the day and the following week.

The district retains integrity of design. All of the original buildings (except for the water treatment plant) built during its construction, and during its use, retain their spatial relationship; and continue to reflect their historic functions and technologies as well as aesthetics.

The district retains integrity of materials. No buildings were renovated after construction.

The most significant resources – the cooling towers, reactor building and control room, were constructed with materials and technology needed to house this type of industry, and there have been no changes to these resources in terms of materials.

There has been removal of equipment, such as reactor piping, steam generator, water pumps, and such in the various structures. While the removal of the equipment that was the "heart" of the unit has been

[4]United States Nuclear Regulatory Commission, "Three Mile Island-Unit 2," http://www.nrc.gov/info-finder/decommissioning/power-reactor/three-mile-island-unit-2.html, Accessed 20 November 2009. Per the NCR, the current radiological decommissioning cost estimate is $831.5 million. [redacted] the

removed in part due to contamination and requirements of "monitored storage," it is still possible to get a sense of the overall feeling and association of a nuclear power plant.

In an effort to demonstrate integrity, the preparer has included historic and current photographs side by side when possible.

TMI Unit-2 Cooling Tower A
Photo 10

TMI Unit-2 Cooling Tower B
Photo 11

Note removal of bases of the cooling towers as compared to historic photograph.

Oblique [view of] TMI [Three Mile Island], April 11, 1979
Arc Identifier 540028; The National Archives

Key # 079154

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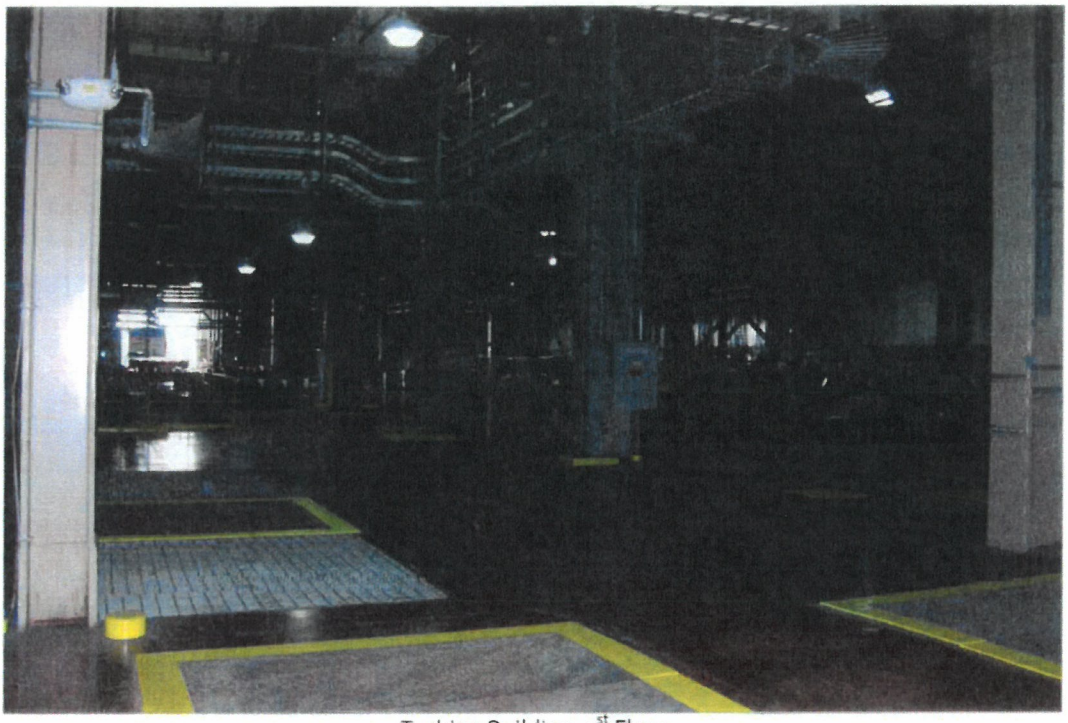
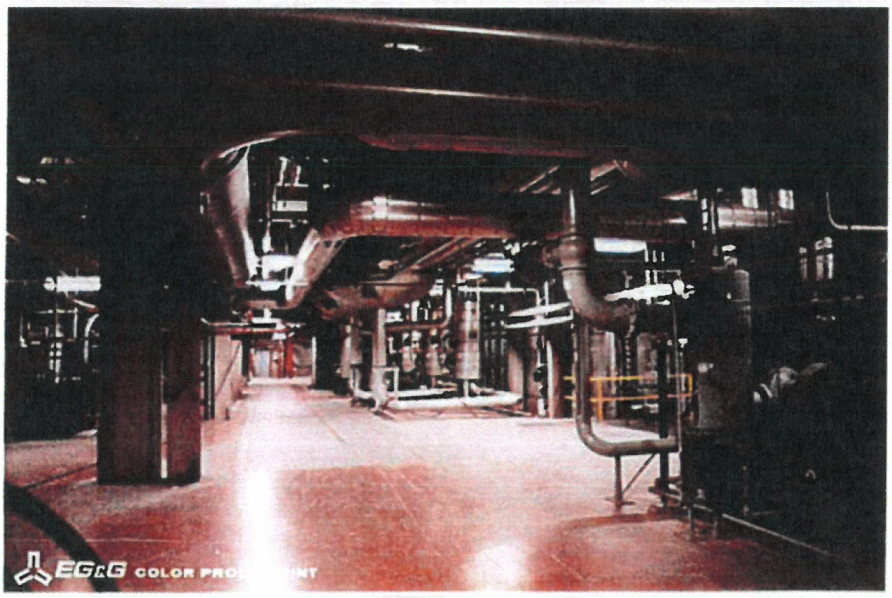
Basement of Turbine Building
Photo 1

Basement of Turbine Building, Condensate Pump Heads
Photo 4



Turbine Building, 1st Floor
Photo 6
The yellow painted lines represent where equipment used to stand



Reactor piping; April 03, 1979
ARC Identifier 540035; The National Archives
Turbine Building

Key # [redacted]

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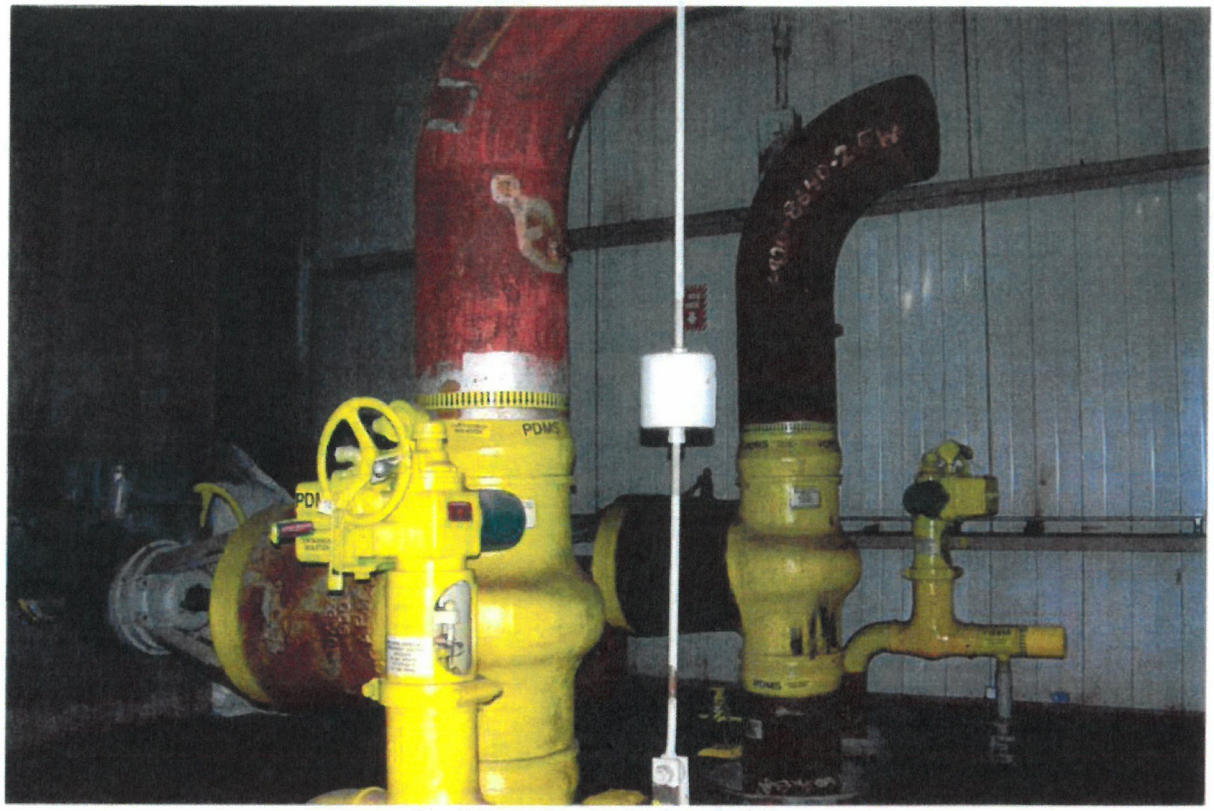
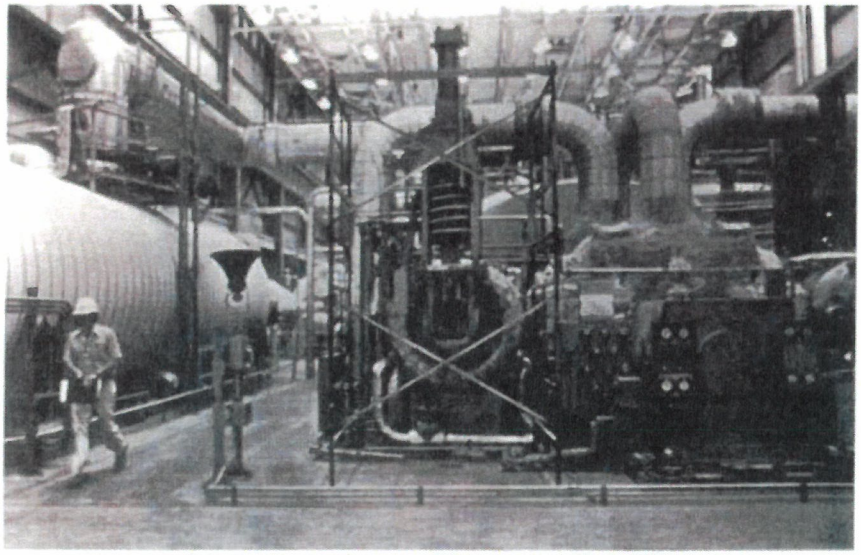
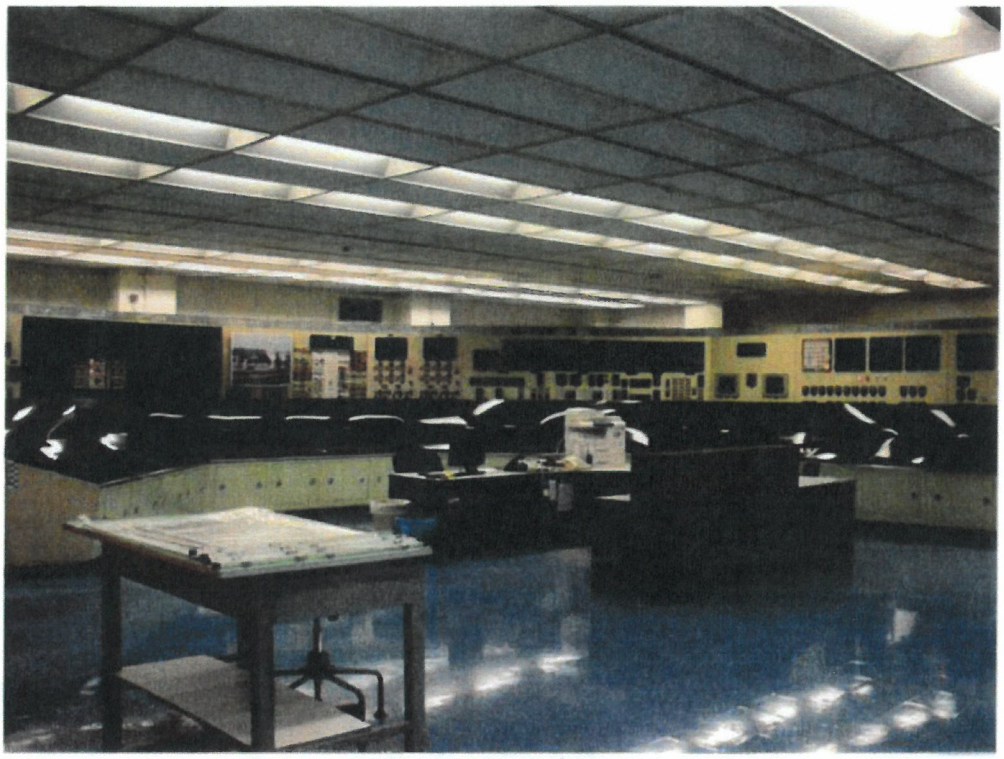


Feed Water Pumps, Turbine Building
Photo 12
(In historic photograph below, these pipes are too the far right)



High Pressure Turbine, in TMI Unit 2 Turbine Building
Source: Nuclear Regulatory Commission Special Inquiry Group, "Three Mile Island, A Report to the Commissioners and to the Public," Volume 1, 1980.



TMI-Unit 2 Control Room
Photo 13
**All of the knobs, switches, instrument panels are extant. Black plastic covers have been placed on top of all non-functioning portions (Some are still used to monitor Unit 2)

Unit 1?

President Jimmy Carter and Mrs. Carter in the control room of the TMI-2 reactor...accompanied by Harold Denton, director of the the NRC's Office of Nucelar Reactor Rgulation and James R. Floyd, supervisor of TMI-2 operations.
Jimmy Carter Library, photo nr nlc10137.16a

TMI-Unit 2 Control Room
Photo 15

TMI supervisors confer in the Unit 2 control room during the accident
www.threemileisland.org/downloads/221.pdf

Key # [redacted]

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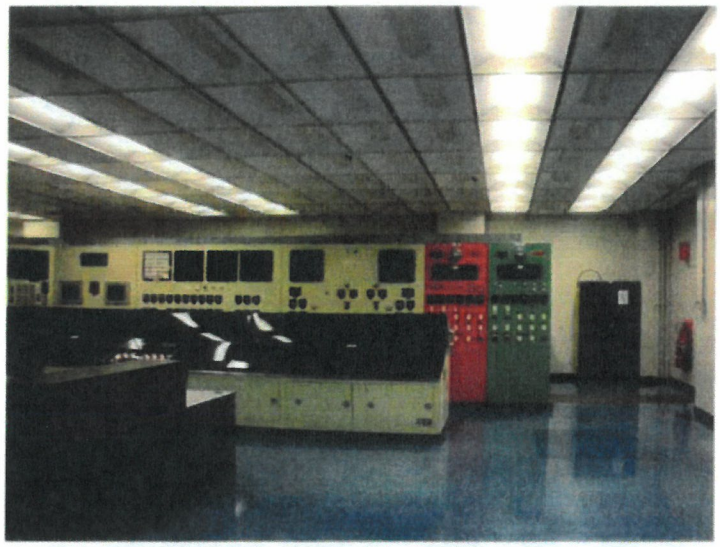
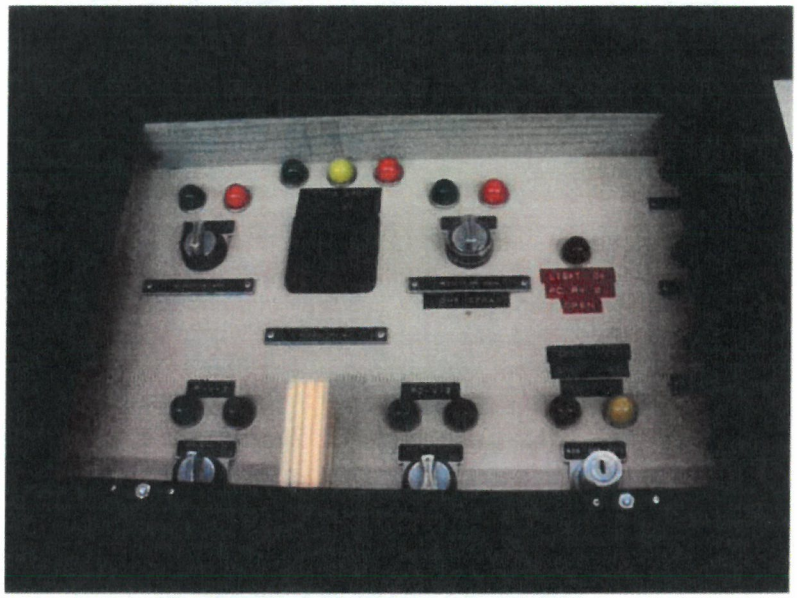
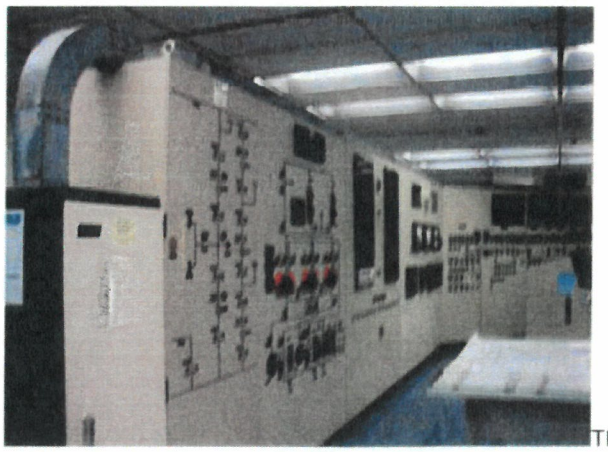


TMI-Unit 2 Control Room, Photo 16



TMI-Unit 2 Control Room, Photo 17

***"Valve Open" light on Control Panel (red labeling) is the one involved in the incident



TMI-Unit 2 Control Room, Photo 14

Key # [redacted]

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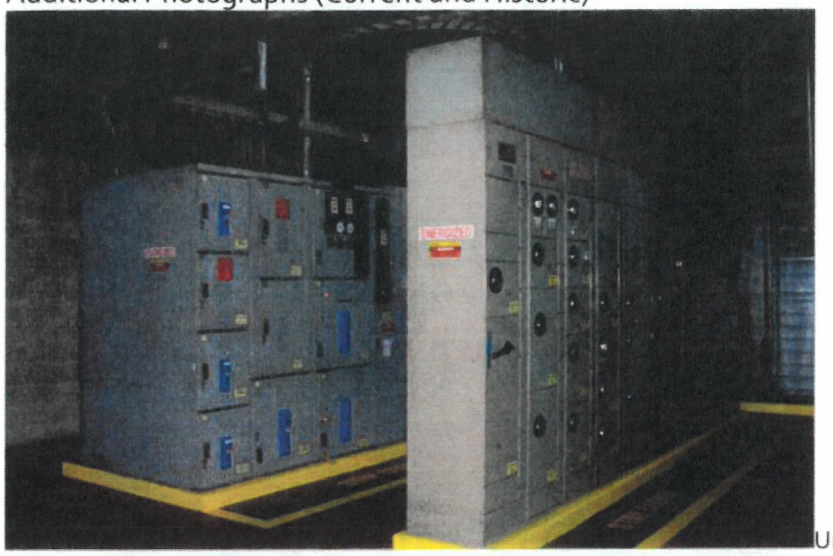
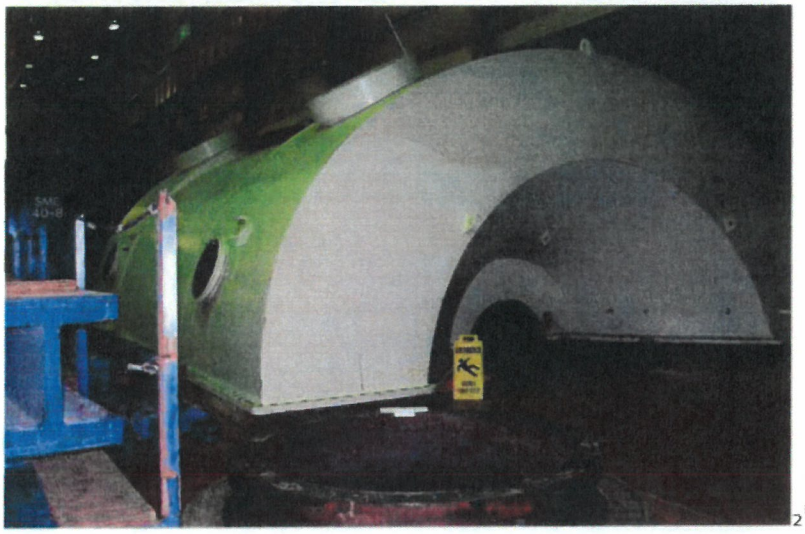
Additional Photographs (Current and Historic)



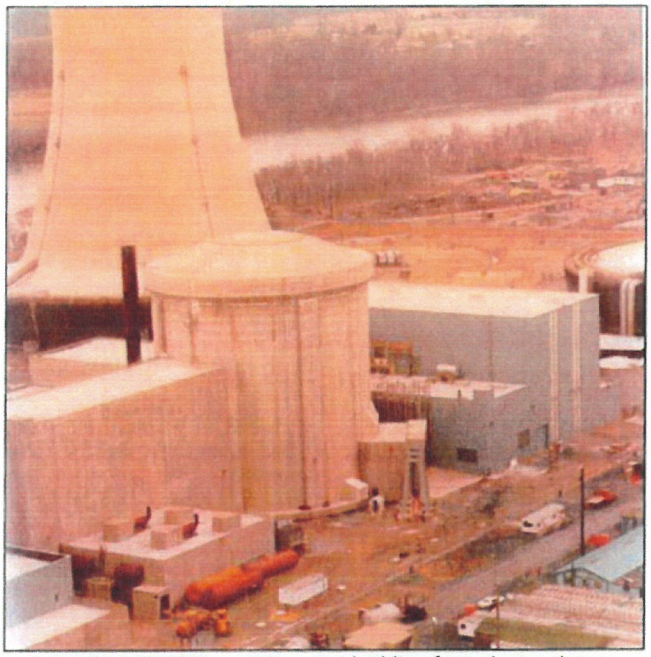
Unit Substation, Photo 5



2nd Floor Turbine Bldg, Turbine, Photo 8

Misc. Auxiliary Buildings, Photo 9

TMI-Unit 2 cooling towers (background), and both unit's containment buildings



TMI Unit-2 Containment (reactor) building from the northwest.
The Fuel Handling Building is the adjoining concrete building on the left; the Turbine Building is the gray structure on the right.
NARA, RG 220 Binder DE 9040025, Image 21, 3-31-79.

Key # [redacted]

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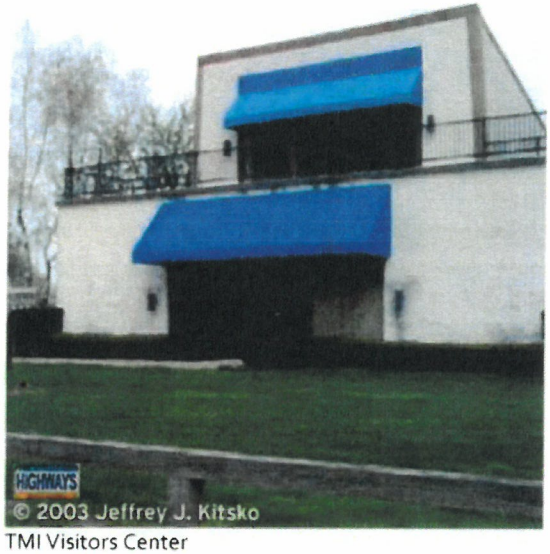
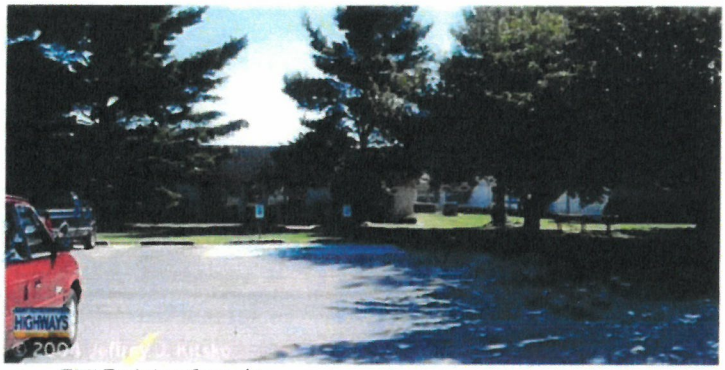


TMI Visitors Center
Copyright Jeffrey J. Kitsko, 2003
www.pahighways.com



TMI Training Complex
Copyright Jeffrey J. Kitsko, 2004
www.pahighways.com

Signs by South Bridge, turnoff Highway 441, April 06, 1979
ARC Identifier 540013; The National Archives

Key # [redacted]

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History and Significance (Item 39)

The subject of this HRSF is TMI-Unit 2 and the events that occurred the week of March 28, 1979 through April 4, 1979. March 28th, 1979 is the date that the "worst nuclear power accident in the United States" occurred, and on April 4, 1979, then Pennsylvania Governor Richard L. Thornburgh appeared on the "Today Show" and stated the threat of an immediate catastrophe had ended.

Brief overview of nuclear power plants in the United States

While the atomic age originated in Illinois when Enrico Fermi and other scientists at the University of Chicago on December 2, 1942 achieved the first nuclear chain reaction, the U.S. commercial nuclear industry was born in Pennsylvania.[5] The Shippingport Nuclear Power Station in Beaver County, Pennsylvania was the first commercial central electric-generating station in the United States to use nuclear energy for peacetime uses. The reactor went online December 2, 1957 (was in operation until October 1982.)

By the end of 1962, there were four operating reactors in the United States.[6] The United States is the world's largest supplier of commercial nuclear power, with thirty-one states having commercial nuclear power plants. Nearly one-third of the nation's total capacity is located in just four states - Illinois, Pennsylvania, and North and South Carolina. Pennsylvania ranks second, behind Illinois, in total nuclear capacity and nuclear generation. "Of the 253 nuclear power reactors originally ordered in the United States from 1953 to 2008, 48 percent were canceled, 11 percent were prematurely shut down, 14 percent experienced at least a one-year-or-more outage, and 27 percent are operating without having a year-plus

[5]Energy Information Administration Official Energy Statistics from the U.S. Government, "Pennsylvania Nuclear Industry," http://www.eia.doe.gov/cneaf/nuclear/page/at_a_glance/states/statespa.html. Accessed 9 November 2009. "In a dramatic high-tech display, ground was broken in 1954 during dedication ceremonies by President Dwight D. Eisenhower, who also opened it on May 26, 1958, as part of his "Atoms for Peace" program. Shippingport is located on the Ohio River about 25 miles from Pittsburgh. The reactor plant was designed by the Westinghouse Electric Corporation in cooperation with the Division of Naval Reactors of the Atomic Energy Commission. The design effort had been redirected to peace-time power generation from a large-scale light water reactor for a proposed aircraft carrier. Constructed to advance nuclear fission technology in general, the plant was flexible in accommodating cores of different types. Various manufacturers with different designs and materials for components were used. Water in the primary system, heated by nuclear fission, flows to the heat exchanging system, which absorbs the heat. This heat turns water in the secondary system, a relatively low pressure system, to steam. This steam is sent to the turbine generator to drive the turbine. The first power at Shippingport was produced on December 18, 1957, and was fed into the grid for the Pittsburgh area. On December 2, 1977, the first U.S. light water breeder reactor went to full power at Shippingport." http://www.asme.org/Communities/History/Landmarks/Shippingport_Nuclear_Power.cfm. Other stations (extant and not extant) in Pennsylvania include: The Peach Bottom Atomic Power Station, in York County which is still in service. Unit 1 was an experimental helium-cooled graphite-moderated reactor (1966-1974). Two other units, General Electric boiling water reactors, placed on-line in 1974, are still in operation. The Beaver Valley Power Station, near Shippingport, it has two Westinghouse pressurized water reactors. The Limerick Generating Station, Limerick Township, Montgomery County, which has two General Electric boiling water reactor units, cooled by natural draft cooling towers. Site and plans were announced in 1969 by PECO (now Exelon). Community protests and other delays pushed construction to 1974. Commercial operation began in 1986 and 1990. The Susquehanna Steam Electric Station, Salem Township, Luzerne County, which has two General Electric boiling water reactors. The Saxton Nuclear Generating Station, Bedford County, which began operations in November 1961 and was shut down May 1, 1972.

[6]Walsh, 24.

outage. Thus, only about one fourth of those ordered, or about half of those completed, are still operating."[7] As of 2009, the U.S. Nuclear Regulatory Commission had received applications for permission to construct 18 new nuclear power reactors.[8]

Perception of nuclear power in Pennsylvania before the accident

In the late 1960s to mid 1970s, there was public opposition by Pennsylvanians to at least three nuclear propositions. The 1968 AEC-backed Plowshare nuclear engineering proposal, 'Project Ketch," a "feasibility pilot project for the creation of more than a thousand natural gas storage caverns deep under the Appalachian Highlands...these caverns were to have been formed by underground explosions of fifty-kiloton nuclear bombs" created so much opposition that the proposal was abandoned.[9] In 1969, "a site on the north branch of the Susquehanna River was proposed for a demonstration liquid metal fast breeder reactor until local residents mobilized enough political support to defeat the project."[10] There was a 1975 defeat of energy parks in Pennsylvania, when "a consortium of four Pennsylvania utilities proposed...to construct one to five 10,000 to 20,000 megawatt coal-fired and nuclear energy parks in rural areas of the state before the year 2000. The plan envisioned groups of up to twenty 800 to 1,200 megawatt electrical fossil fueled units and nuclear reactors on a single site."[11]

In addition, at least two citizen groups developed during this time, including "a broad based cluster of Pennsylvania and New Jersey environmental, consumer, and local citizens' organizations [who] formed the Environmental Coalition on Nuclear Power (EACNP).[12] The Three Mile Island Alert was formed in 1977, which was a "non-profit citizens' organization dedicated to the promotion of safe-energy alternatives to nuclear power and is especially critical of the Three Mile Island nuclear plant."

Yet it appears that the majority of Pennsylvanians living around Three Mile Island did not oppose its construction or the idea of nuclear power. On April 19, 1968, the Atomic Energy Commission issued a non-contested permit to Metropolitan Edison for its construction of the station, and "preliminary hearings were virtually devoid of rancor; there were no charges of landgrabbing, no residential dislocations."[13] In addition,

> "Before the accident, there seems to have been more awe of the plant than hatred or fear. One man, who later became a leader in the anti-restart movement, told us that he, like many residents, was proud of the technological achievement that the nuclear plant represented. Prior to the accident, he took all of his visitors to Three Mile Island. He described leading tours past the plant and making comparisons and allusions to the pyramids of Egypt."[14]

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[7] Al Gore , *Our Choice: A Plan to Solve the Climate Crisis* (Rodale Books, 2009), 157.
[8] U.S. NRC, "Combined License Applications for New Reactors," http://www.nrc.gov/reactors/new-reactors/col.html
[9] Walsh, 30.
[10] Walsh, 30.
[11] Walsh, 30.
[12] Walsh, 30. Concentrated on license hearings (since came into the fray after construction permits had already been issued for most of the nuclear plants).
[13] Nuclear Regulatory Commission Special Inquiry Group, "Three Mile Island, A Report to the Commissioners and to the Public," Volume 1, 1980. 2.
[14] Goldsteen, 14.

Protest of nuclear power in the United States before the accident

Historian Thomas Wellock traces the birth of the anti-nuclear movement to the 1958 controversy over the plans to build the first commercially viable nuclear power plant at San Francisco's Bodega Bay. Furthermore, the environmental movement used the National Environmental Policy Act of 1969 "to raise questions about the consequences of nuclear power on the ecology of local areas. Prior to NEPA, for example, there was no legal basis for opposing the construction of a nuclear plant because of environmental issues such as thermal pollution. "[15] In the landmark Calvert Cliffs federal court ruling of 1971, "environmental impact statements became required before the AEC could issue a construction permit."[16] By 1975, *Forbes Magazine* was reporting that "the anti-nuclear coalition has been remarkably successful...and has certainly slowed the expansion of nuclear power."

The Three Mile Island Unit-2 Accident

The narrative below explaining the TMI-Unit 2 accident and subsequent events has been taken directly from the United States Nuclear Regulatory Commission's Fact Sheet on the Three Mile Island accident.

Summary of Events

> "The accident began about 4:00 a.m. on March 28, 1979, when the plant experienced a failure in the secondary, non-nuclear section of the plant. The main feedwater pumps stopped running, caused by either a mechanical or electrical failure, which prevented the steam generators from removing heat. First the turbine, then the reactor automatically shut down. Immediately, the pressure in the primary system (the nuclear portion of the plant) began to increase. In order to prevent that pressure from becoming excessive, the pilot-operated relief valve (a valve located at the top of the pressurizer) opened. The valve should have closed when the pressure decreased by a certain amount, but it did not. Signals available to the operator failed to show that the valve was still open. As a result, cooling water poured out of the stuck-open valve and caused the core of the reactor to overheat.
>
> As coolant flowed from the core through the pressurizer, the instruments available to reactor operators provided confusing information. There was no instrument that showed the level of coolant in the core. Instead, the operators judged the level of water in the core by the level in the pressurizer, and since it was high, they assumed that the core was properly covered with coolant. In addition, there was no clear signal that the pilot-operated relief valve was open. As a result, as alarms rang and warning lights flashed, the operators did not realize that the plant was experiencing a loss-of-coolant accident. They took a series of actions that made conditions worse by simply reducing the flow of coolant through the core.
>
> Because adequate cooling was not available, the nuclear fuel overheated to the point at which the zirconium cladding (the long metal tubes which hold the nuclear fuel pellets) ruptured and the fuel pellets began to melt. It was later found that about one-half of the

[15] Walsh, 27.
[16] Walsh, 27.

core melted during the early stages of the accident. Although the TMI-2 plant suffered a severe core meltdown, the most dangerous kind of nuclear power accident, it did not produce the worst-case consequences that reactor experts had long feared. In a worst-case accident, the melting of nuclear fuel would lead to a breach of the walls of the containment building and release massive quantities of radiation to the environment. But this did not occur as a result of the three Mile Island accident.

The accident caught federal and state authorities off-guard. They were concerned about the small releases of radioactive gases that were measured off-site by the late morning of March 28 and even more concerned about the potential threat that the reactor posed to the surrounding population. They did not know that the core had melted, but they immediately took steps to try to gain control of the reactor and ensure adequate cooling to the core. The NRC's regional office in King of Prussia, Pa., was notified at 7:45 a.m. on March 28. By 8:00, NRC Headquarters in Washington, D.C., was alerted and the NRC Operations Center in Bethesda, Md., was activated. The regional office promptly dispatched the first team of inspectors to the site and other agencies, such as the Department of Energy and the Environmental Protection Agency, also mobilized their response teams. Helicopters hired by TMI's owner, General Public Utilities Nuclear, and the Department of Energy were sampling radioactivity in the atmosphere above the plant by midday. A team from the Brookhaven National Laboratory was also sent to assist in radiation monitoring. At 9:15 a.m., the White House was notified and at 11:00 a.m., all non-essential personnel were ordered off the plant's premises.

By the evening of March 28, the core appeared to be adequately cooled and the reactor appeared to be stable. But new concerns arose by the morning of Friday, March 30. A significant release of radiation from the plant's auxiliary building, performed to relieve pressure on the primary system and avoid curtailing the flow of coolant to the core, caused a great deal of confusion and consternation. In an atmosphere of growing uncertainty about the condition of the plant, the governor of Pa., Richard L. Thornburgh, consulted with the NRC about evacuating the population near the plant. Eventually, he and NRC Chairman Joseph Hendrie agreed that it would be prudent for those members of society most vulnerable to radiation to evacuate the area. Thornburgh announced that he was advising pregnant women and pre-school-age children within a 5-mile radius of the plant to leave the area.

Within a short time, the presence of a large hydrogen bubble in the dome of the pressure vessel, the container that holds the reactor core, stirred new worries. The concern was that the hydrogen bubble might burn or even explode and rupture the pressure vessel. In that event, the core would fall into the containment building and perhaps cause a breach of containment. The hydrogen bubble was a source of intense scrutiny and great anxiety, both among government authorities and the population, throughout the day on Saturday, March 31. The crisis ended when experts determined on Sunday, April 1, that the bubble could not burn or explode because of the absence of oxygen in the pressure vessel. Further, by that time, the utility had succeeded in greatly reducing the size of the bubble.

Key #[redacted]

ER#

Impact of the Accident

The accident was caused by a combination of personnel error, design deficiencies, and component failures. There is no doubt that the accident at Three Mile Island permanently changed both the nuclear industry and the NRC. Public fear and distrust increased, NRC's regulations and oversight became broader and more robust, and management of the plants was scrutinized more carefully. The problems identified from careful analysis of the events during those days have led to permanent and sweeping changes in how NRC regulates its licensees – which, in turn, has reduced the risk to public health and safety. Here are some of the major changes which have occurred since the accident:

Upgrading and strengthening of plant design and equipment requirements. This includes fire protection, piping systems, auxiliary feedwater systems, containment building isolation, reliability of individual components (pressure relief valves and electrical circuit breakers), and the ability of plants to shut down automatically;

Identifying human performance as a critical part of plant safety, revamping operator training and staffing requirements, followed by improved instrumentation and controls for operating the plant, and establishment of fitness-for-duty programs for plant workers to guard against alcohol or drug abuse;

Improved instruction to avoid the confusing signals that plagued operations during the accident;

Enhancement of emergency preparedness to include immediate NRC notification requirements for plant events and an NRC operations center that is staffed 24 hours a day. Drills and response plans are now tested by licensees several times a year, and state and local agencies participate in drills with the Federal Emergency Management Agency and NRC;

Establishment of a program to integrate NRC observations, findings, and conclusions about licensee performance and management effectiveness into a periodic, public report;

Regular analysis of plant performance by senior NRC managers who identify those plants needing additional regulatory attention;

Expansion of NRC's resident inspector program – first authorized in 1977 – whereby at least two inspectors live nearby and work exclusively at each plant in the U.S. to provide daily surveillance of licensee adherence to NRC regulations;

Expansion of performance-oriented as well as safety-oriented inspections, and the use of risk assessment to identify vulnerabilities of any plant to severe accidents;

Strengthening and reorganization of enforcement as a separate office within the NRC; The establishment of the Institute of Nuclear Power Operations (INPO), the industry's own "policing" group, and formation of what is now the Nuclear Energy Institute to

provide an unified industry approach to generic nuclear regulatory issues, and interaction with NRC and other government agencies;

The installing of additional equipment by licensees to mitigate accident conditions, and monitor radiation levels and plant status;

Employment of major initiatives by licensees in early identification of important safety-related problems, and in collecting and assessing relevant data so lessons of experience can be shared and quickly acted upon; and expansion of NRC's international activities to share enhanced knowledge of nuclear safety with other countries in a number of important technical areas."[17]

Significance

"The accident at the Three Mile Island Unit 2 (TMI-2) nuclear power plant near Middletown, Pa., on March 28, 1979, was the most serious in U.S. commercial nuclear power plant operating history, even though it led to no deaths or injuries to plant workers or members of the nearby community. But it brought about sweeping changes involving emergency response planning, reactor operator training, human factors engineering, radiation protection, and many other areas of nuclear power plant operations. It also caused the U.S. Nuclear Regulatory Commission to tighten and heighten its regulatory oversight. Resultant changes in the nuclear power industry and at the NRC had the effect of enhancing safety. The sequence of certain events – equipment malfunctions, design-related problems and worker errors – led to a partial meltdown of the TMI-2 reactor core but only very small off-site releases of radioactivity."[18]

While the accident at TMI Unit-2 was not the first, the last, the largest, the smallest, the most expensive, or the deadliest "industrial" or even "nuclear" accident in the nation's history, it occurred with devastating effect to the confidence of Pennsylvania residents, in addition to the nation, towards the nuclear energy industry and its leadership and oversight, including the federal government during the event and well into the future.

MetEd formally declared the first ever "State of General Emergency" at a nuclear power plant in the United States on March 28, 1979.

Even after all the assurances of the nuclear energy community that nuclear stations were safe...

> Dr. Herbert Kouts, head of the Division of reactor Safety research told the Associated Press on January 14, 1974 "the preliminary results...suggest there will never be a major accident in a nuclear power plant."[19]
>
> AEC officials "claimed...a person has about as much chance of dying from an atomic reactor accident as being struck by a meteor."[20]

[17] United States Nuclear Regulatory Commission, "Backgrounder on the Three Mile Island Accident," 11 August 2009, http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html, Accessed 19 November 2009.
[18] United States Nuclear Regulatory Commission, "Backgrounder on the Three Mile Island Accident," 11 August 2009, http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html, Accessed 19 November 2009.
[19] Walsh, 28.

...An accident did occur.

President Carter's "President's Commission on the Accident at Three Mile Island," formed two weeks after the accident, found that "to prevent nuclear accidents as serious as Three Mile Island, fundamental changes will be necessary in the organization, procedures, and practices-and above all-in the attitude of the Nuclear Regulatory Commission and, to the extent that the institutions we investigated are typical, of the nuclear industry."[21]

Steven Reed, State Representative, June 20, 1979 stated in regards to re-opening Unit 1, and the possibility of re-opening Unit 2.

> "I must warn you all, citizens and collected officials alike, not to fall prey to that type of folly. To believe once again people who have systematically misled us, misrepresented their position, misstated and distorted and warped the facts and withheld the facts – something they are doing up and including this date-I cannot believe that we could even give thought to placing credibility in their continued assurances for public safety after an accident happened that was not supposed to happen in the first place, according to them."[22]

Middletown minister on Sunday

> Pray for "all those who have come to our town from far away to keep us informed of developments...even if their reports are contradictory."[23]

Governor Richard Thornburgh –

> "I've often noted that I had little time to be personally frightened during the accident because of the constant press of the responsibility for the well being of nearly a quarter of a million central Pennsylvanians. The high points of my concerns were largely due to false or misleading information conveyed to the general public which required countermanding from my office. For example, the bogus evacuation recommendation from the NRC on Friday morning, March 30; the so-called "bubble" in the reactor reported on Saturday evening, March 31; and various news accounts exaggerating the potential for a nuclear meltdown throughout the incident. As a result of TMI, my level of skepticism about nuclear power was substantially raised and, like most Americans, I no longer took for granted the fact that this source of electric power was as risk-free as its promoters had indicated in its early years. This attitude has, I believe, resulted in a number of changes that make today's operating nuclear facilities much less risky than those in operation prior to the TMI accident."[24]

Oran Henderson, director of Pennsylvania Emergency Management Agency

> "The TMI kind of an accident we had here was one that we really hadn't planned on. The assumption was that the level of safety attained by the nuclear power plants was more than adequate to meet the needs. Also they never spent too much time on it. As far as our

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[20] Walsh, 28.
[21] *Report of the President's Commission on the Accident at Three Mile Island-The Need for Change: The Legacy of TMI*, 1979, 7.
[22] Del Tredici, 49.
[23] Hampton, 64.
[24] Richard Thornburgh, "Governing in a Nuclear Crisis," March 29, 1999. http://discuss.washingtonpost.com/wp-srv/zforum/99/thornburgh0329.htm.

priorities of planning were concerned, we were more concerned with flash floods, tornadoes, chemical spills. So we had not devoted the degree of attention to a nuclear power plant that the lessons of TMI had pointed out we should have. And not only the state government but the federal government and local governments were all caught, I won't say napping, but we were caught short."[25]

NRC, 2009

"The TMI-2 accident had the greatest impact on nuclear generation of any single event in history."

The accident also showcased the role of citizen protest groups for "the partial meltdown at TMI had raised serious questions about the safety of these reactors in the minds of most Harrisburg politicians, including Governor Dick Thornburgh, thus facilitating their subsequent siding with citizen protest groups on may public safety issues. Most importantly, the proximity of the accident site to the state capital provided easy access to lawmakers and other state officials for politically active citizens."[26]

Crowd at rally. Anti-nuke rally in Harrisburg [Pennsylvania] at the Capitol. April 09, 1979; ACR Identifier 540017; The National Archives

Demonstrators' signs. Anti-nuke rally in Harrisburg [Pennsylvania] at the Capitol April 09, 1979; ARC Identifier 540020; The National Archives

[25] Robert Del Tredici, *The People of Three Mile Island* (San Francisco: Sierra Club Books, 1980), 34.
[26] Walsh, 48.

TMI-Unit 2 meets National Register Criterion A for its association with the events that occurred during March 28, 1979 through April 4, 1979, which on local, state and national levels constitute historic events that have made a significant contribution to the broad patterns of our history. In connection with the events of that week, TMI Unit-2 is significant in the area of Industry. The district is exceptionally significant in the history of the United States as the location of events that immediately influenced the lives of the residents of the Commonwealth of Pennsylvania, profoundly influenced the awareness (or lack of) millions of Americans in regards to nuclear power, and for its role in symbolizing those events for Americans. Images, interviews and first-hand accounts were broadcast and recorded by the media as well as by the general public. Today, people from all over the world come to see the site of the nation's worst nuclear accident.[27]

In 1983, PHMC evaluated Three Mile Island, Key # 079154 (the entire site) for National Register of Historic Places eligibility. The comments of the staff at that time concluded that not enough time had passed since its construction or the event for the significance of this site to be evaluated or viewed without prejudice.

It is the opinion of the preparer, now thirty-one years later; it is now possible to evaluate the event's significance without prejudice. Therefore, the district meets the requirement of National Register Criteria Consideration G that a property achieving significance within the last 50 years must be of exceptional importance. The accident was the catalyst for nuclear reform. Within two weeks of the event, actions in the form of analyzing the event occurred. Within months, the events and actions had been fully determined. In addition to the numerous primary resources (see list at end of HRSF) that document the event, there has been secondary documentation within the last twenty years that can attest to the effect this event has had on the nuclear energy industry and the nation.

[27]In 1999, a Pennsylvania Historical and Museum Commission historical marker was placed along State Highway 441, south of the TMI-1 Visitor Center sign, to commemorate the 20th anniversary of the accident, the marker reads: "NUCLEAR ACCIDENT AT THREE MILE ISLAND On March 28, 1979, and for several days thereafter - as a result of technical malfunctions and human error - Three Mile Island's Unit 2 Nuclear Generating Station was the scene of the nation's worst commercial nuclear accident. Radiation was released, a part of the nuclear core was damaged, and thousands of residents evacuated the area. Events here would cause basic changes throughout the world's nuclear power industry. "

Comparisons

The purpose of this HRSF is not to compare Three Mile Island to other nuclear stations for its significance, rather what and how the event that occurred at TMI Unit-2 itself is significant. Therefore, the comparisons used are similar in nature for the reaction and awareness they created in terms of regulation, legislation, response, local leadership, protest and news coverage. In addition, since the event is being presented as having National significance, the comparisons are not confined to similar events in Pennsylvania.

The Cuyahoga River Fire, 1969 (Ohio)

The Cuyahoga River which had been referred to in the 1880s by Cleveland Mayor Rensselaer R. Herrick as "a sewer that runs through the heart of the city," continued to be a dumping ground for the pollutants produced by the industrial era well into the 1960s. On June 22, 1969, an oil slick and debris in the Cuyahoga River caught fire for approximately one-half hour in Cleveland, Ohio. Months later *Time* magazine reported on the event and stated,

> Some River! Chocolate-brown, oily, bubbling with subsurface gases, it oozes rather than flows. "Anyone who falls into the Cuyahoga does not drown," Cleveland's citizens joke grimly. "He decays". . . The Federal Water Pollution Control Administration dryly notes: "The lower Cuyahoga has no visible signs of life, not even low forms such as leeches and sludge worms that usually thrive on wastes." It is also -- literally -- a fire hazard."[28]

1960s - Source: *Plain Dealer* file

Interestingly, no photograph of the actual fire exists, and when the *Times* article ran they used a photo from the 1952 fire. By then the "fire had begun to take on 'mythic status, and errors of fact became unimportant to the story's obvious meaning."

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[28] **Ohio History Central, "Cuyahoga River Fire," http://www.ohiohistorycentral.org/entry.php?rec=1642, Accessed 24 November 2009.**

While the river had caught on fire previously in 1868, 1883, 1887, 1912, 1922, 1936, 1941, 1948 and 1952, many credit the half-hour 1969 fire "as being a catalyst for Congress to finally pass the Clean Water Act in 1972 and for the creation of agencies like the Environmental Protection Agency."[29] While the city voters had just approved a $100 million bond issue in November 1968 for the cleanup of the river, it was Mayor Carl Stokes (the first black mayor of a major American city) that was the "true catalyst for taking the fire beyond Cleveland to a national stage."[30]

Former Cleveland City Utilities Director Ben Stefanski recalled

> "We didn't realize that the river had even burned until the next morning...We already had national reporters here viewing and reviewing what he was doing with the city and it just so happened that the fire was there and they were there and they wanted to know what he would do about stopping the pollution in the river and stopping the fires that had occurred for the last 50 years, some of them really big fires.
> Stefanski said that up until then, most city workers, city officials and even the media and the public weren't all that interested in air or water pollution.
> But Stokes was a quick study...he saw the problem of pollution and understood what the ramifications were on the city.
> He also understood the possible solutions and he was able to articulate this to the press and later to Congress. Even though he was not an expert on water pollution, he was the mayor of a major city that was affected by a polluted river.
> So he gave real context and meaning to what the problems really were."[31]

Jonathan Adler, environmental historian and law professor at Case Western Reserve University stated

> "the fire did contribute a huge amount to the new environmental movement and it put the issue in front of everyone else, too. Water pollution became a tangible, vivid thing – like it had never been on a national level."[32]

Sierra Club President Adam Werbach stated in a 1997 CNN interview

> "I mean a river lighting on fire was almost biblical. And it energized American action because people understood that that should not be happening."[33]

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[29] Damon Sims, "Cuyahoga River Fire 40 Years Ago Ignited an Ongoing Cleanup Campaign," The *Plain Dealer*, http://www.cleveland.com/science/index.ssf/2009/06/cuyahoga_river_fire_40_years_a.html, Accessed 11 November 2009.
[30] Sims.
[31] Sims.
[32] Mike Rose, "Cuyahoga River Fire Galvanized Clean Water and the Environment as a Public Issue," April 12, 2009, *The Plain Dealer*, http://blog.cleveland.com/metro/2009/04/cuyahoga_river_fire_galvanized.html, Accessed 13 January 2010.
[33] Rose.

Love Canal, 1978 (New York)

The Love Canal site is located in the City of Niagara Falls, Niagara County, New York. In the 1890s, private developer William T. Love with backing from financiers proposed a canal, a large industrial complex and city to be constructed. Due to an economic depression and technological advances in electrical power, the funding and need for Love's industrial utopia disappeared by 1910. From 1942 - 1952, Hooker Chemicals and Plastics used the partially dug canal as a landfill for the disposal of over 21,000 tons of various chemical wastes, including halogenated organics, pesticides, chlororbenzenes and dioxin. In 1953, the landfill was covered over, and sold to the Niagara Falls Board of Education. Land near the covered landfill was residentially developed (including an elementary school). During the 1960s and 70s, problems with odors and residues began as the water table rose, bringing contaminated groundwater to the surface. In April 1978, the New York Department of Health Commissioner, Robert Whalen, declared the Love Canal a threat to human health and in August, declared a health emergency at Love Canal, closed the elementary school, and recommended temporary evacuation of pregnant women and children who lived nearest to the site. A week later, on August 7, 1978, Governor Hugh Carey announced the state would purchase some of the homes closet to the site (Ring 1, later also Ring 2); at the same time President Jimmy Carter approved emergency financial aid for the Love Canal area (a first time occurrence for and event other than a "natural" disaster) and ordered the Federal Disaster Assistance Agency to assist the City of Niagara Falls.[34]

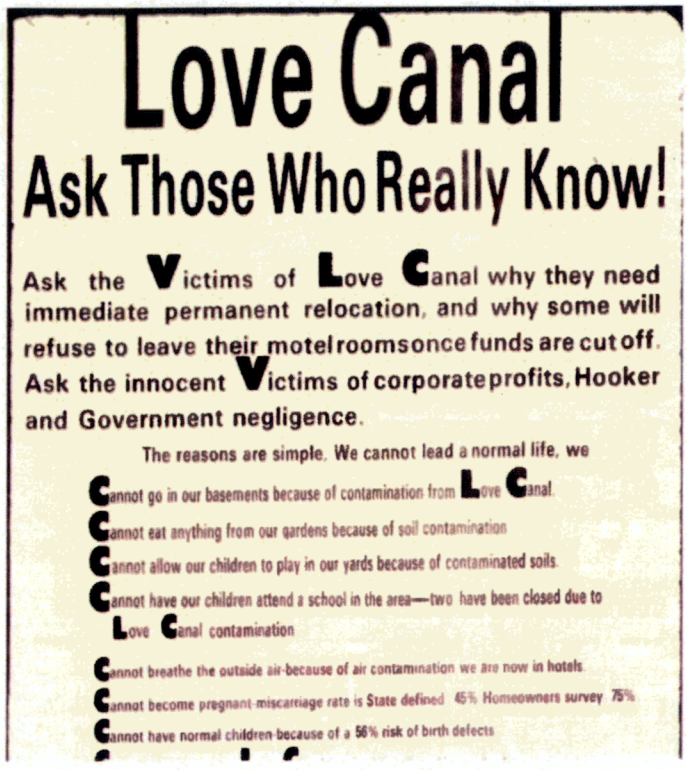
"Amid this setting, individuals (most notably Lois Gibbs, Dr. Beverly Paigen, and Sister Margeen Hoffmann, OSF) and local neighborhood (such as the Love Canal Homeowners Association) and community groups (such as the Ecumenical Task Force of the Niagara Frontier) became concerned about the situation. Their primary concern was the actual extent of the chemical contamination and its impact on the health of Love Canal residents. Second, and perhaps more important, was the lack of readily available information to explain the science: the levels of uncertainty, political and corporate agendas, manipulation of the media -- in general an overall paucity of reliable information that would answer the simple question, "Is it safe?" [35]

Protest march by Love Canal families carrying effigies and signs with the message "Dioxin Kills" c. 1978. New York State Department of Health Collection, State University of New York at Buffalo

[34]Eckardt C. Beck, "The Love Canal Tragedy," *EPA Journal* (January 1979), http://www.epa.gov/history/topics/lovecanal/01.htm, Accessed 19 November 2009; "Background Information," Love Canal Collections, University at Buffalo, the State University of New York, http://library.buffalo.edu/specialcollections/lovecanal/about/background.php, Accessed 19 November 2009.

[35] "Background Information."

"Love Canal was the first hazardous waste disposal case to draw national attention, and thus remains a landmark case. Congress drew on information from the Love Canal case when it debated and passed the Comprehensive Emergency Response, Compensation and Liability Act (CERCLA – also known as the "Superfund" Act). The Love Canal court battles actually provided one of the first tests of the new law."[36]



Love Canal

Ask Those Who Really Know!

Ask the Victims of Love Canal why they need immediate permanent relocation, and why some will refuse to leave their motel rooms once funds are cut off. Ask the innocent Victims of corporate profits, Hooker and Government negligence.

The reasons are simple. We cannot lead a normal life, we

Cannot go in our basements because of contamination from Love Canal.

Cannot eat anything from our gardens because of soil contamination

Cannot allow our children to play in our yards because of contaminated soils.

Cannot have our children attend a school in the area—two have been closed due to Love Canal contamination

Cannot breathe the outside air because of air contamination we are now in hotels.

Cannot become pregnant miscarriage rate is State defined 45% Homeowners survey 75%

Cannot have normal children because of a 56% risk of birth defects

Love Canal Homeowners Association's full-page newspaper ad (produced in response to Hooker's ads) stating reasons why Love Canal victims need help from the government
October 18, 1979, Penelope D. Ploughman Love Canal Collection, State University of New York at Buffalo

[36] Mark A. Zaremba, "Love Canal – An Introduction," Online Ethics Center for Engineering and Research, http://onlineethics.org/CMS/enviro/envirocases/lcanal.aspx. Accessed 19 November 2009.

Key # [redacted]

ER# _____

Glossary

Cladding - The thin-walled metal tube that forms the outer jacket of a nuclear fuel rod. It prevents the corrosion of the fuel by the coolant and the release of fission products in the coolants. Aluminum, stainless steel and zirconium alloys are common cladding materials.

Emergency feedwater system - Backup feedwater supply used during nuclear plant startup and shutdown; also known as auxiliary feedwater.

Fuel rod - A long, slender tube that holds fuel (fissionable material) for nuclear reactor use. Fuel rods are assembled into bundles called fuel elements or fuel assemblies, which are loaded individually into the reactor core.

Containment - The gas-tight shell or other enclosure around a reactor to confine fission products that otherwise might be released to the atmosphere in the event of an accident.

Coolant - A substance circulated through a nuclear reactor to remove or transfer heat. The most commonly used coolant in the U.S. is water. Other coolants include air, carbon dioxide, and helium.

Core - The central portion of a nuclear reactor containing the fuel elements, and control rods.

Decay heat - The heat produced by the decay of radioactive fission products after the reactor has been shut down.

Decontamination - The reduction or removal of contaminating radioactive material from a structure, area, object, or person. Decontamination may be accomplished by (1) treating the surface to remove or decrease the contamination; (2) letting the material stand so that the radioactivity is decreased by natural decay; and (3) covering the contamination to shield the radiation emitted.

Feedwater - Water supplied to the steam generator that removes heat from the fuel rods by boiling and becoming steam. The steam then becomes the driving force for the turbine generator.

Nuclear Reactor - A device in which nuclear fission may be sustained and controlled in a self-supporting nuclear reaction. There are several varieties, but all incorporate certain features, such as fissionable material or fuel, a moderating material (to control the reaction), a reflector to conserve escaping neutrons, provisions for removal of heat, measuring and controlling instruments, and protective devices.

Pressure Vessel - A strong-walled container housing the core of most types of power reactors.

Pressurizer - A tank or vessel that controls the pressure in a certain type of nuclear reactor.

Primary System - The cooling system used to remove energy from the reactor core and transfer that energy either directly or indirectly to the steam turbine.

Radiation - Particles (alpha, beta, neutrons) or photons (gamma) emitted from the nucleus of an unstable atom as a result of radioactive decay.

Secondary System - The steam generator tubes, steam turbine, condenser and associated pipes, pumps, and heaters used to convert the heat energy of the reactor coolant system into mechanical energy for electrical generation.

Steam Generator - The heat exchanger used in some reactor designs to transfer heat from the primary (reactor coolant) system to the secondary (steam) system. This design permits heat exchange with little or no contamination of the secondary system equipment.

Turbine - A rotary engine made with a series of curved vanes on a rotating shaft. Usually turned by water or steam. Turbines are considered to be the most economical means to turn large electrical generators.

Key #_____

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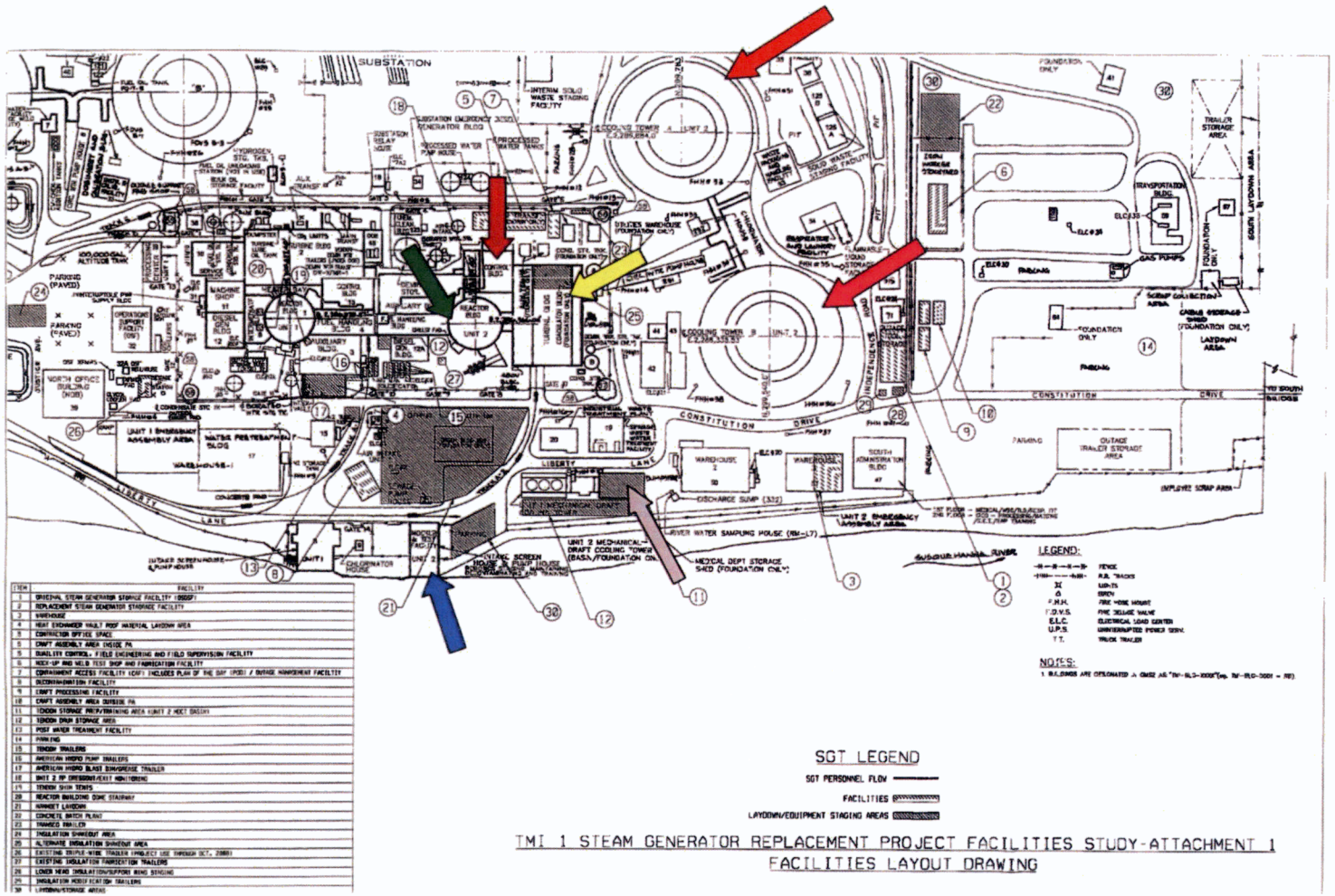

ITEM	FACILITY
1	ORIGINAL STEAM GENERATOR STORAGE FACILITY (OSGSF)
2	REPLACEMENT STEAM GENERATOR STORAGE FACILITY
3	WAREHOUSE
4	HEAT EXCHANGER VAULT MOST MATERIAL LAYDOWN AREA
5	CONTRACTOR OFFICE SPACE
6	CRAFT ASSEMBLY AREA INSIDE PA
7	QUALITY CONTROL FIELD (ENGINEERING AND FIELD SUPERVISION FACILITY
8	HOT-UP AND WELD TEST SHOP AND FABRICATION FACILITY
9	CONTAINMENT ACCESS FACILITY (CAF) INCLUDES PLAN OF THE DAY (POD) / OUTAGE MANAGEMENT FACILITY
10	DECONTAMINATION FACILITY
11	CRAFT PROCESSING FACILITY
12	CRAFT ASSEMBLY AREA OUTSIDE PA
13	TENDON STORAGE PREPARATION AREA (UNIT 2 MOAT BASIN)
14	TENDON DRUM STORAGE AREA
15	POST WATER TREATMENT FACILITY
16	PARKING
17	TENDON TRAILERS
18	AMERICAN HYDRO PUMP TRAILERS
19	AMERICAN HYDRO BLAST SAW/GREASE TRAILER
20	UNIT 2 RV OBSERVE/EXIT MONITORING
21	TENDON SHIM TENTS
22	REACTOR BUILDING DOME STAIRWAY
23	HANNETT LAYDOWN
24	CONCRETE BATCH PLANT
25	TRAILER TRAILER
26	INSULATION SHAKEOUT AREA
27	ALTERNATE INSULATION SHAKEOUT AREA
28	EXISTING TRIPLE-WIDE TRAILER (PROJECT USE THROUGH OCT. 2000)
29	EXISTING INSULATION FABRICATION TRAILERS
30	LOWER HEAD INSULATION/SUPPORT RING STAGING
31	INSULATION MODIFICATION TRAILERS
32	LAYDOWN/STORAGE AREAS

SGT LEGEND

SGT PERSONNEL FLOW

FACILITIES

LAYDOWN/EQUIPMENT STAGING AREAS

TMI 1 STEAM GENERATOR REPLACEMENT PROJECT FACILITIES STUDY-ATTACHMENT 1
FACILITIES LAYOUT DRAWING

Cooling Tower A, Unit 2

Cooling Tower B, Unit 2

Reactor Building, Unit 2

Unit 2 Mechanical Draft Cooling Tower (Basin/foundation only)

Intake Screen & Pump House, Unit 2 (Robotics staging, maintaining, decontaminating and training - Mockup & Test facility – now used for Unit 1)

Control Building, Unit 2

Turbine Building; Coagulator Build[illegible] - foundation only (previously Unit 2's water pre treatment building)

Date Unknown, but most likely 1990s-2000s

Key #__ _____

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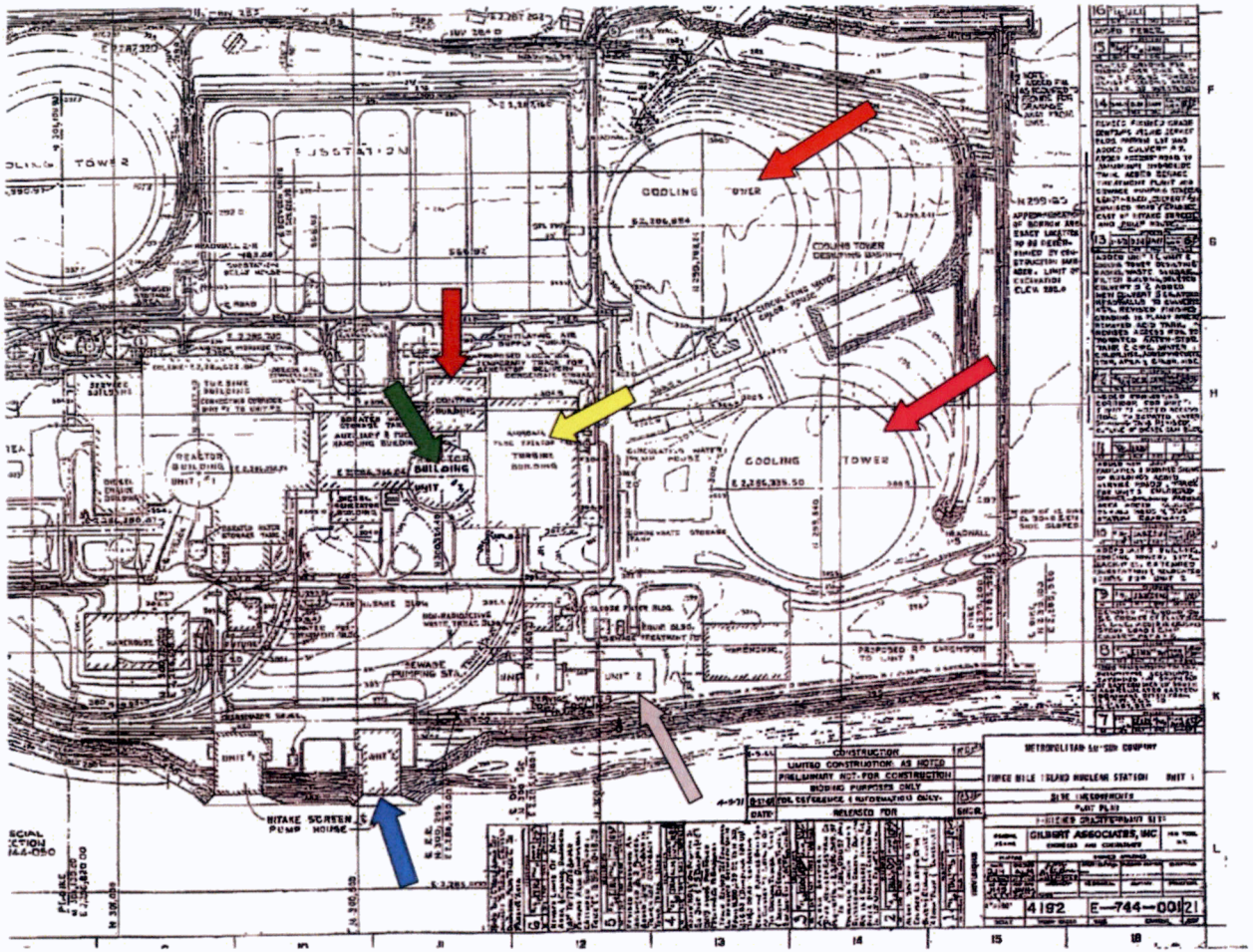

Cooling Tower Unit 2

Cooling Tower Unit 2

Reactor Building, Unit 2

Service Water Post Cooling Tower Unit 2

Intake Screen Pump House Unit 2

Control Building, Unit 2

Turbine Building, Unit 2

Original station construction 1965-71

Repository	Title	#	Author	Catalog #	Resource
State Archives					
	Records of Special Commissions	RG-25			
	Pennsylvania Commission on Three Mile Island Nuclear Power Plant				
	Department Files 1979-1980 (3 boxes)			25.169	Reports and plans prepared at the request of Governor Richard Thornburgh by department of Pennsylvania's government regarding the accident at Three Mile Island. Information provided varies with somewhat according to the nature of each department but generally includes date of report, description of actions taken or proposed actions and recommendations for the future.
	First Thirty Days, 1979 (2 boxes)			25.138	Newspaper clippings, press releases, telegrams, and memoranda chronicling unfolding daily events during the first thirty days after the accident. Included is a summary of the events occurring during the first thirty days and Western Union telegrams sent to Governor Richard Thornburgh from concerned citizens urging immediate evacuation of the area surrounding the plant.
	Legislative Subcommittee Reports 1979-1980 (1 box)			25.139	Legislative subcommittee reports, memoranda, and notes concerning the economic impact, emergency management, environmental, health, and legal aspects of the Three Mile Island accident. Subjects addressed are reactions of department heads addressed and programs for recovery. The series was created in the office of William W. Scranton who served as Pennsylvania's Lieutenant Governor during the accident.
	Miscellaneous 1979-1980 (4 boxes)			25.14	Miscellaneous reports generated by various federal and state government commissions concerning the accident at Three Mile Island. These include testimony of Governor Richard Thornburgh, the General Public Utilities Economic Impact Report, Three Mile Island 1 Hearings, Nuclear Regulatory Commission reports, and the report of the Pennsylvania Commission on Three Mile Island.
	Press Related Publications 1970-1981 (3 boxes)			25.414	Publications, memoranda, reports, and newspaper clippings concerning the Three Mile Island Accident. Many of these provide a general overview of the accident and of the nuclear industry in general including nuclear terrorism, the national nuclear debate, public opinion surveys in Pennsylvania regarding the Three Mile Island Accident and its aftermath, and financial fallout including property tax implications.

	Publications and Reports 1977-1981 (9 boxes)			25.142	Publications and reports collected by the Commission on various aspects of the nuclear industry and the Three Mile Island nuclear facility. The reports were issued by the President's Commission on the Accident at Three Mile Island, Pennsylvania government agencies, and private experts in nuclear technology. Specific subjects include information on how a nuclear reactor works, the Technical Staff Analysis Report on the Radiation Health Effects Task Group, and investigative reports on the Three Mile Island accident and local governments. Among these are the Report submitted by Commission Chairman John Kemeny, a 1977 interim acceptance plan for physical security at nuclear power plants, a 1979 Cumberland County evacuation plan, and a 1979 Dauphin County action and response plan. Also present are news editorials, Legal Aspects of Three Mile Island Accident, and the Nuclear Regulatory Commission Plan for Cleanup Operations at Three Mile Island Unit 2.
	Transcripts and Proceedings 1979 (8 boxes)			25.143	Transcripts of the proceedings of the President's Commission on Three Mile Island that was created by President Jimmy Carter that met from April 25 – October 22, 1979. This commission consisted of a panel of experts who were charged with investigating the causes and making recommendations in the aftermath of the nuclear accident at Three Mile Island. The type of information provided is date of hearing, names of those present, transcripts of the testimony and recommendations considered.
	Harold & Lucinda Denton Papers	MG 471			A graduate of North Carolina State College and a former Dupont Corporation engineer, Harold R. Denton was Director of the United States Nuclear Regulatory Commission during the 1979 accident at the Three Mile Island nuclear power plant. Denton served as the chief of operations at the site during and after the crisis, keeping the public informed about what had happened and what measures were being taken to correct the situation.

	General Correspondence 1979-1984 (2 boxes)			471.1	Correspondence received by Harold and Lucinda Denton relating to the accident at Three Mile Island. Consists primarily of letters and cards from the general public expressing their views on the accident and Denton's handling of it, invitations and acknowledgements for speaking engagements, and letters from strangers and acquaintances concerning travel and leisure activities during the Dentons' stay in central Pennsylvania. Many of the letters express gratitude for Denton's handling of the crisis, though some correspondents sought answers to questions or criticized the public health hazards posed by nuclear power plants.
	Official Correspondence 1978-1981 (1 folder)			471.2	Official correspondence sent or received by Harold Denton concerning the accident at Three Mile Island and its aftermath. Correspondents include D. F. Bunch, Chief of the Program Support Branch of the Nuclear Regulatory Commission, Ben Rush, Executive Director of the Energy Research Institute, Richard Pontz of the Fund-Raising Counsel for Philanthropic Institutions, Fred Young of The Hearst Corporation, F. Marshall Rock, Jr., Director of the Pennsylvania House Select Committee, Raymond Reedy, Mayor of Lititz, and Peter H. Kostmayer of the United States House of Representatives. Also present are two White House press releases dated September 9, 1980 designating Harold Denton a "Distinguished Executive" for outstanding performance in handling the Three Mile Island accident. Finally, there are several copies to Harold Denton of correspondence passing between others.
	Reports 1979-1981 (5 volumes and 1 folder)			471.3	Reports issued by the U. S. Nuclear Regulatory Commission and the Department of Energy in the wake of the Three Mile Island accident.
	Newspaper and magazine articles and newsletters 1979-1999 (3 folders)			471.5	copy of an article by Cyril L. Colmar entitled "Risk A Pragmatic De Minimis Approach" that appeared in the January 26, 1979 issue of Science, official journal of the American Association for the Advancement of Science, A copy of article entitled Chronology of Events at Three Mile Island" in the April 4, 1979 issue of THE NEWS, Mexico City, copy of article entitled "Lawsuits Begin A Burden of Proof" in April 8, 1979 issue of the Philadelphia Inquirer, A copy of the April 16, 1979 issue of the Harrisburg Patriot News with lead article entitled "The Agony of the Atom" by Staff Writer Pat Carroll:, A Copy of a May 1, 1979 newsletter entitled Access to Energy, A Pro-Science, Pro-Technology, Pro-Free Enterprise Monthly Newsletter published in Boulder, Colorado:,

	Newspaper and magazine articles and newsletters 1979-1999 (3 folders)			471.5	A photocopy of an article by Mike Gray entitled "What Really Happened at Three Mile Island" that appeared in the May 17, 1979 issue of Rolling Stone:,A Copy of newspaper entitled Energy News Digest of Nuclear Hazards versus Alternative Energies dated February 28, 1980 published by the Energy Awareness Center of Woodstock, New York:,A Copy of a newspaper dated July, 1980 entitled TMI Today that was published by the Three Mile Island Nuclear Power Station.
	Newspaper and magazine articles and newsletters 1979-1999 (3 folders)			471.5	A copy of the December 6, 1983 newsletter entitled The Energy Daily published in Washington, D. C.:,Media Update A Summary of the Important Newspaper Articles Regarding Three Mile Island for the week of April 6, 1989:,A copy of article entitled "TMI Ten Years Later, Still a Center of Nuclear Debate" in the March 20, 1989 issue of USA Today:,Copy of an article entitled "TMI It Touched the Way We Lived" in March 24, 1989 issue of Lancaster Intelligencer Journal:,Three Mile Island 10 Years After," Centre Daily Times, March 26, 1989.
	Magazines 1979-1999 (1 box)			471.8	People Magazine (dated April 23, 1979 and March 24, 1980), featuring articles on Harold Denton. A copy of the February 1980 issue of Susquehanna Magazine containing a biographical sketch on Harold Denton. Life Magazine, May 1979 containing an article entitled "Crisis in the World of Nuclear Power. After Three Mile Island, Big Questions About Safety and the Future." The New Yorker, October 19, 1981 containing an article entitled "A Reporter at Large, Nuclear Waste" by Fred C. Shapiro.Newsweek, June 27, 1983 containing article entitled "The Lessons Learned at Three Mile Island" by Eileen Keerdoja, Sylvester Monroe and Mary Lord.

	Magazines 1979-1999 (1 box)			471.8	Atari Connection, Fall 1983 containing an article entitled "Nuclear Troubleshooter Stays Sharp with Scram Video Game Imitates Life" by Paul Cohen.Nuclear News, A Publication of the American Nuclear Society, March 1985 containing an article entitled "The Nuclear Construction Predicament - Part 1 A Regulator Responds to an Interview with the NRC's Harold Denton" by John Graham. Three copies of George Magazine, March 1999 containing an article entitled "Nightmare at Three Mile Island" by Harold Denton. U.S. News and World Report, March 29, 1999 containing an article entitled "When the World Stopped, Twenty Years After the Three Mile Island Accident the Debate Still Rages
	Mounted News Clippings, 1979 and undated (1 folder)			471.1	Contemporary news clippings concerning the Three Mile Island accident mounted on white sheets of paper. The newspapers from which the clippings were taken include *The State* of Columbia, South Carolina, Harrisburg *Evening News*, Lancaster *New Era*, Lititz *Record Express*, Harrisburg *Sunday Patriot News*, Rocky Mountain, North Carolina *Telegram*, *The Detroit News*, *The Miami Herald*, *The Plain Dealer*, *The Kansas City Times*, *Washington Post* and *Washington Star*.
	Photocopies of News Clippings, undated (1 folder)			471.11	Photocopies of contemporary newspaper articles concerning the Three Mile Island accident. Most of the articles are dated April and May, 1979 and are from newspapers all over the United States
	TMI Memorabilia, undated (1 folder)			471.12	Bumper stickers and miscellaneous advertising for purchasing bumper stickers, Three Mile Island Creamy Mushroom Dressing, collector's edition TMI lamps, and tours of the TMI countryside. Also present is an invitation to the Denton family to attend an evening treasure hunt at Hersheypa on May 9, 1980.
	Video and Audio Tapes, 1999 (1 box)			471.14	Video tapes of Pennsylvania Cable News Network interviews of the 20th Anniversary Press Conference of Harold Denton held on March 25, 1999 and of related PCN broadcasts entitled "Remembering Three Mile Island," "Three Mile Island and Media Relations" and "Three Mile Island Call-In Program." Also present is a video tape for a WITF program on Three Mile Island and original audio tapes of Historian Ken Wolensky's interviews with Harold Denton and retired General Public Utilities President Robert Long that were conducted on March 25 and March 26, 1999 respectively. Transcripts are present for the latter two interviews.

	Publications and Reports 1977-1981 (9 boxes)			25.142	Publications and reports collected by the Commission on various aspects of the nuclear industry and the Three Mile Island nuclear facility. The reports were issued by the President's Commission on the Accident at Three Mile Island, Pennsylvania government agencies, and private experts in nuclear technology. Specific subjects include information on how a nuclear reactor works, the Technical Staff Analysis Report on the Radiation Health Effects Task Group, and investigative reports on the Three Mile Island accident and local governments. Among these are the Report submitted by Commission Chairman John Kemeny, a 1977 interim acceptance plan for physical security at nuclear power plants, a 1979 Cumberland County evacuation plan, and a 1979 Dauphin County action and response plan. Also present are news editorials, Legal Aspects of Three Mile Island Accident, and the Nuclear Regulatory Commission Plan for Cleanup Operations at Three Mile Island Unit 2.
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	Dick Thornburgh Papers	MG 404			PA Governor
	Three Mile Island			4-2742 box 6	1979 -files contain letters, telegrams, clippings and resolutions
	Three Mile Island			4-2743 box 7	1979
	Three Mile Island			4-2744 box 8	1980
	Three Mile Island			4-2745 box 9	1981-1982
	Three Mile Island			4-2746 box 10	1983
	Subject Correspondence/Sampled			4-3276 box 861	School Children, TMI Letters, 1986
	Alan B.K. Rabinowitz, Deputy Executive Assistant for Correspondence			4-3325 box 1309	Word Processing Center/Mass Mailings (Unemployment Compensation, TMI, Others)
	Richard A. Snyder Collection,	MG 373			
	Subject File, 1963-1984			MG37300100002 0000C002513153 9	Nuclear TMI-PA Emergency, 30 Folders.
	Carton 25			MG37300100002 0000F066913153 9	Three Mile Island (TMI) 2 Folders, 1983-84
	Records of the Public Utility Commission	RG-37			
	Secretary's Bureau Three Mile Island Investigation Records 1968-1988 (22 cartons)			37.3	Documents relating to the investigation of the Three Mile Island Nuclear Plant accident of March 28, 1979 and the financial consequences resulting from it. Included in this series are docket case files, residential petitions, testimony and exhibit files, hearing transcripts, Three Mile Island Unit daily flow documents, and pre-incident, incident and post-incident documents, such as testimony and hearing transcripts, exhibits, correspondence, petitions, orders, and reports. Also found are related case items, including Public Utility Commission Docket Number 1-790404308, Pennsylvania Public Utility v. Metropolitan Edison Company and Pennsylvania Electric Company, and Three Mile Island Unit 1 docket 50-89 documents
	Records of the Energy Office	RG-63			Finding Aid not online as of yet
	Records of the PA Emergency Management Agency	RG-69			

	Minutes and Agendas, 1591-1985 (3 cartons, 1 box)			69.1, Cartons 2&3	Records include minutes, agendas, reports, manuals, lists of members, transcripts and correspondence. There are minutes for special meetings, meetings that pertained to an immediate disaster or other pressing issue. Special meeting minutes are not accompanied by an agenda and after 1972, the Council stopped printing out separate agendas altogether. Meeting topics included floods, radiation, school and community fallout shelters, emergency supplies, personnel, budgets and droughts. Major crises mentioned are the Cuban Missile crisis, Three Mile Island, 1974 national trucker strike, 1977 flooding and the 1979-1980 drought. Also included are letters of appointment from the Governor and General Assembly.
	Records of the Department of Health	RG-11			Nothing specific in any "title"
	Records of the Department of General Services - Commonwealth Media Services	RG-20			
	Audio Tapes of Gov. Thornburgh's Interviews, 1986			20.39	"Governor Dick Thornburgh discusses the 1979 TMI Disaster during a 1986 National Public Radio Show" (Recorded off-air of WITF-FM) (1 tape), "Governor Dick Thornburgh on TMI Disaster, National Public Radio, 1986 (Recorded off-air of WITF-FM, Harrisburg) (1 tape), "Governor Dick Thornburgh on TMI, National Public Radio, 1986" (1 tape)
	Video Tapes, 1980-1986			1070 - V00001T	3.27.1980 Dauphin County, Governor, Denton/Thornburgh TMI Press Conference
				1073 - V00063T	7.9.1981, Dauphin County, Governor, TMI Cleanup Proposal
				1075 - V00092T-V00093T	8.10.1981, Governor, NGG-TMI Statement
				1076 - V00112T-V00114T	Governor, TMI Cleanup-US Senate Hearings
State Library					

	Accident at the Three Mile Island nuclear power plant [microform]: oversight hearings before a task force of the Subcommittee on Energy and the Environment of the Committee on Interior and Insular Affairs, House of Representatives, Ninety-sixth Congress, first session	Hearings	US Congress.House. Committee on Interior and Insular Affairs. Subcommittee on Energy and the Environment	Forum Room 116 CIS Microfiche	1979
	Adequacy of nuclear powerplant security: hearing before the Subcommittee on Clean Air and Nuclear Regulation of the Committee on Environment and Public Works, United States Senate, One Hundred Third Congress, first session, March 19, 1993.	Hearings	US Congress.Senate.Committee on Environment and Public Works. Subcommittee on Clean Air and Nuclear Regulation	Y 4.P 96/10 S.HRG.103-57	1993
	Answers to frequently asked questions about cleanup activities at Three Mile Island, Unit 2/TMI Program Office, Office of Nuclear Reactor Regulation, US Nuclear Reactor Regulation			Y 3.N 88 10/0732/rev.1	1984
	Calculations to estimate the margin to failure in the TMI-2 vessel (microfilm)		Stickler, L.A.	Y 3.N 88 25/6196	1994
	Civil Defense aspects of the Three Mile Island nuclear accident hearings before the Military Installations and Facilities Subcommittee of the Committee on Armed services, House of Representatives, Ninety-six Congress	Hearings	US Congress.House. Committee on Armed Services. Subcommittee on Military Installations and Facilities	CIS 80 H201-7	1980
	Cleanup efforts at Three Mile Island	Hearings	US. Congress.House. Committee on Energy and Commerce. S subcommittee on Oversight and Investigations	CIS 82 H361-67	1982
	Color photographs of the Three Mile Island Unit 2 reactor containment building		Eldam, Gregory R. and J. Thomas Horan, prepared for the US Department of Energy	E 1.28 GEND-008/v.1	1981
	Crisis contained The Department of Energy at Three Mile Island A History		Cantelon, Philip L. and Robert C. Williams	E 1.28 DOE/EV/10278-T1	1980

	Crisis evacuation during the Three Mile Island nuclear accident The TMI population registry	Division of Epidemiology Research, PA Dept of Health	Goldhaber, Marilyn K. and James E. Lehman	N68sP P4	1983
	Cumberland County radiological emergency response plan for incidents at the Three Mile Island Nuclear Power Stations		Cumberland County Office of Emergency Preparedness		1981
	Current status of the Three Mile Island nuclear generating station, units 1 and 2	Hearings	US. Congress. House.Committee on Interior Insular Affairs. Subcommittee on Energy and the Environment	CIS 83 H441-27	1983
	Dauphin county radiological emergency response plan for incidents at the Three Mile Island Nuclear Station		Dauphin County Emergency Management Agency		1987
	Demanding democracy after Three Mile Island		Goldsteen, Raymond L	363.1799 G578d	1991
	Democracy in the shadows citizen mobilization in the wake of the accident at Three Mile Island		Walsh, Edward J.	363.179 W168d	1988
	Effects of the accident at Three Mile Island on residential property values and sales		Gamble, Hays Bentley	Y 3.N 88 25/2063	1981.Prepared for Division of Safeguards, Fuel Cycle and Environmental Research, Office of Nuclear regulatory Research
	Evaluation of nuclear facility decommissioning projects		Doerge, D.H.	Y 3.N 88 25/3884	1984. Prepared for Division of Engineering Technology, Office of Nuclear regulatory Research
	Evaluation of public relations strategy in the US nuclear energy industry after Three Mile Island		Lawrence, Patricia H.	13-75402	1995
	Evaluation of the Three Mile Island unit 2 reactor building decontamination process		Dougherty, D.	Y 3.N 88 25/3381	1983. Prepared for Division of Waste Management, Office of Nuclear Material Safety and Safeguards, US Nuclear Regulatory Commission
	Final report on a social survey of Three Mile Island area residents		Brunn, Stanley D.	621.483 B897	1979
	Financial implications of the accident at Three Mile Island	Hearings	US.Congress.House.Committee on Interior and Insular Affairs.Subcommitte on Energy and the Environment	CIS 81 H441-27	1981

	Financing the cleanup of the Three Mile Island nuclear powerplant	Hearings	US.Congress.Senate.Committee on Energy and Natural Resources	CIS 82 S311-17	1982
	Governor Dick Thornburgh's proposal to finance the cleanup of Three Mile Island				
	Health-related behavioral impact of the Three Mile Island nuclear incident		Houts, Peter S.		1980. Submitted to the TMI Advisory Panel on Health Research Studies of the PA Department of Health
	Health -related economic costs of the Three-Mile Island Accident		Pennsylvania State University		1981. Submitted to the Division of Epidemiological Research, PA Department of Health
	Impact abroad of the accident at the Three Mile Island Nuclear Power Plant			CIS 80 S402-13	1980. Prepared for the Subcommittee on Energy, Nuclear Proliferation, and Federal Services of the Committee on Governmental Affairs
	Implementation of section 507 of the Clean Air Act	Hearings	US.Congress.Senate.Committee on Environment and Public Works. Subcommittee on Clean Air and Nuclear Regulation	Y 4.P 96/10 SHRG.103-60	1993
	In the US District Court for the Middle District of PA In re Three Mile Island litigation, civil action no. 79-0432			KFP380.A8 15	1985
	Investigation into the March 28, 1979, Three Mile Island accident		US Nuclear Regulatory Commission, Office of Inspection and Enforcement	Y 3.N 88 10/0600	1979
	Lancaster County radiological emergency response plan for incidents at the Three Mile Island Nuclear Station				
	Lebanon County radiological emergency response plan for incidents at the Three Mile Island Nuclear Station				
	Management weaknesses affect Nuclear Regulatory Commission efforts to address safety issues common to nuclear power plants		US.General Accounting Office.	GA 1.13 RCED-84-149	
	The meltdown, or The bologna merchants	fiction	Keisling, William	813.54 K268m	1990
	Meltdown a race against nuclear disaster at Three Mile Island a reporter's story	juvenile literature	Hampton, Wilborn	363.1799 H189m	2001

	Meltdown at Three Mile Island	video	Steward/Gazit Productions for the American Experience	363.179 M495	
	News releases		PA Commission to Study and Evaluate the Consequences of the Incident at Three Mile Island	PY T5312.15/4	1979
	Nuclear plant terrorism		Portzline, Scott D.	363.32 P839n	1994
	Nuclear Property Insurance Act of 1981 [microform]: hearing before the Committee on Environment and Public Works, United States Senate, Ninety-seventh Congress,		US.Congress.Senate.Committee on Environment and Public Works.	CIS 82 S321-33	1982
	Nuclear safety--three years after Three Mile Island [microform]: joint hearing before certain subcommittees of the Committees on Government Operations and Interior and Insular Affairs, House of Representatives, Ninety-seventh Congress		US.Congress.House.Committee on Government Operations.Environment, Energy, and Natural Resources Subcommittee	CIS 82 H401-33	1982
	People of Three Mile Island/interviews and photos		Del Tredici, Robert	974.831 D388p	1980
	Programmatic environmental impact statement related to decontamination and disposal of radioactive wastes resulting from March 28, 1979 accident, Three Mile Island Nuclear Station, Unit 2, docket no. 50-320: draft supplement dealing with post-defueling monitored storage and subsequent cleanup.		US Nuclear Regulatory Commission. Office of Nuclear Reactor Regulation	Y 3.N 88 10/0683	1988
	Report in response to NRC staff recommended requirements for restart of Three Mile Island Nuclear Station unit 1		Met Ed/GPU?	PY T5312.2 R311	1979?
	Responses of impacted populations to the Three Mile Island nuclear reactor accident: an initial assessment		Barnes, Kent	363.179 R312	1979

	Selections from the Harrisburg papers on the ten-mile rule: selected documents in docket no. 50-289 license no. DPR-50 petition under 10 CFR 2.206, including DD-94-03 to obtain an emergency evacuation plan for the people of Harrisburg		Pennsylvania Institute for Clean Air before the Nuclear Regulatory Commission	363.179 Se48	1994
	The social and economic effects of the accident at Three Mile Island: findings to date		Flynn, C. B.	Y3 N 88 25/1215	1980. Prepared for US Nuclear Regulatory Commission
	Social responses to technological disaster the accident at Three Mile Island	thesis	Richardson, Bradley B.	84-27626	1984
	The socio-economic impacts of the Three Mile Island accident: final report		Governor's Office of Policy and Planning	363.3497 P384s	1980
	The Status of recommendations of the President's Commission on the Accident at Three Mile Island: a ten-year review		US Nuclear Regulatory Commission	Y 3.N 88 10/1355	1989
	Studies of nuclear hazards and constitutional law		Webb, Richard E.	621.4835 W383s	1996
	The Three Mile Island accident diagnosis and prognosis		Toth, L.M. ed	363.179 T4132	1986
	Three Mile Island: a nuclear crisis in historical perspective		Walker, J. Samuel	363.1799 W153t	2004
	Three Mile Island a reader's guide to selected government publications and government-sponsored research publications	bibliography	Hassler, Peggy	363.179016 H278t	1988
	Three Mile Island a selective annotated bibliography	bibliography	Wood, M. Sandra and Suzanne m. Shultz	363.179 W85t	1988
	Three Mile Island, a time of fear		Staley, John C and Roger R. Selp	974.831 T413Z St1	1979
	The Three Mile Island accident a case study of life event appraisal	thesis	Goldsteen, Raymond L	83-27775	1983
	Three Mile Island		Stephens, Mark	621.483509748 St44t	1980
	The Three Mile Island crisis: psychological, social, and economic impacts on the surrounding population		Houts, Peter S.	363.179 H819t	1988
	Three Mile Island Mental health findings		Bromet, Evelyn	PPW 1.2 T531m	1980
	The Three Mile Island nuclear accident continuing policy issues, dilemmas and strategies		Comfort, Louise and Carrie Miller	363.1799 C734t	2003

	Three Mile Island prologue or epilogue		Martin, Daniel	363.3497 M363t	1980
	Three Mile Island socio-economic impact study		Governor's Office of Policy and Planning	PY P712.2 T531m	1979
	Three Mile Island sourcebook annotations of a disaster		Starr, Philip	363.179 T413	1983
	Three Mile Island the most studied nuclear accident in history	report to Congress	Comptroller General of the United States	GA 1.13 EMD 80-190	1980
	Three Mile Island turning point		Keisling, William	621.483 T413	1980
	Three Mile Island's impact on training in the nuclear industry a study of the Commonwealth Edison Company	thesis	Hossbach, Greg R.	95-20158	1994
	TMI-2 Lessons Learned task force final report		US. TMI-2Lessons Learned Task Force	Y 3.N 88 10/0585	1979
	TMI lessons learned better protection for the public and the environment		Commonwealth of PA	PEP 192.2 T626L	2004
	TMI questions & answers		Commonwealth of PA	PEP 192.2 T626q	2004
	The TMI 2 story challenge, change, conclusion		GPU	363.179 T4133	1988
	TMI 25 years later the Three Mile Island nuclear power plant accident and its impact		Osif, Bonnie A.	363.1799 Os4t	2004
	Voices from Three Mile Island the people speak out		Leppzer, Robert, ed.	363.179 V87	1980
	The warning accident at Three Mile Island		Gray, Mike and Ira Rosen	363.179 G793w	1982
	The willingness-to-pay for protection the case of the accident at Three Mile Island	thesis	Slaysman, Kenneth S.	84-09099	1983
	Title list publicly available documents Three Mile Island Unit 2, docket 50-320	bibliography	US Nuclear Regulatory Commission. Division of Technical Information and Document Control	Y 3.N 88 10/0568	1979

US Nuclear Regulatory Commission					Further information on the TMI 2 accident can be obtained from sources listed below. The documents can be ordered for a fee from the NRC's Public Document Room at 301.415.4737 or 1.800.397.4209, email pdr.resource@nrc.gov. The PDR is located at 11555 Rockville Pike, Rockville, Maryland, however the mailing address is U.S. Nuclear Regulatory Commission, Public Document Room, Washington, D.C. 20555. A glossary is also provided below.
	NRC Annual Report - 1979,			NUREG-0690,	
	"Population Dose and Health Impact of the Accident at the Three Mile Island Nuclear Station			NUREG-0558	
	"Environmental Assessment of Radiological Effluents from Data Gathering and Maintenance Operation on Three Mile Island Unit 2,"			NUREG-0681	
	"Report of The President's Commission on The Accident at Three Mile Island," October, 1979				
	"Investigation into the March 28, 1979 Three Mile Island Accident by the Office of Inspection and Enforcement,"			NUREG-0600	
	"Three Mile Island, A Report to the Commissioners and to the Public," by Mitchell Rogovin and George T. Frampton			NUREG/CR-1250, Vols. I-II, 1980	
	"Lessons learned From the Three Mile Island - Unit 2 Advisory Panel,"			NUREG/CR-6252	
	"The Status of Recommendations of the President's Commission on the Accident at Three Mile Island," (A ten-year review),			NUREG-1355	
	"NRC Views and Analysis of the Recommendations of the President's Commission on the Accident at Three Mile Island,"			NUREG-0632	
	"Environmental Impact Statement related to decontamination and disposal of radioactive wastes resulting from March 28, 1979 accident Three Mile Island Nuclear Station, Unit 2,"			NUREG-0683	
	"Answers to Questions About Updated Estimates of Occupational Radiation Doses at Three Mile Island, Unit 2,"			NUREG-1060	
	"Answers to Frequently Asked Questions About Cleanup Activities at Three Mile Island, Unit 2,"			NUREG-0732	

Dickinson College					http //www.threemileisland.org/resource_center/index.php
	Audio				Interviews with administrative assistant, attorney, bookkeeper, clergy, college administrator, college student, Cumberland County clerk, emergency services employee, government agency employee, government official, homemaker, military officer, newspaper editor, physician, etc. 1979
	A Report to the Met-Ed Community Number 1-4		Met-Ed		1979
	Civil Action No. 1 CV-88-1452 (Order & Judgment)		Rambo, Sylvia H. Chief Judge		6/7/1996
	Control Room Operators		General Public Utilities Nuclear		Jun-79
	Looking Beyond the Lessons A Utility Manager's Perspective		Clark, Philip R.		Apr-84
	President's Commission Emergency Preparedness, Emergency Response		Gorinson, Stanley M. Chief Counsel	TK 1344.P4.U578 1979	Oct-79
	President's Commission Report of the Emergency Preparedness and Response Task Force		Dynes, Russell R. Head	TK 1344.P4 U812	Oct-79
	President's Commission Report of the Public's Right to Information Task Force		Rubin, David M. Head	TK 1344.P4 U813	Oct-79
	President's Commission Reports of the Public Health and Safety Task Force		Kemeny, John G. Chairman	TK 1377 U5 1979h	Oct-79
	President's Commission Reports of the Technical Assessment Task Force Vol 1 - 4		Kemeny, John G. Chairman	TK 1345.H37 U54	Oct-79
	President's Commission Role of the Managing Utility and its Suppliers		Gorinson, Stanley M. Chief Counsel	TK 1345.H37 U54	Oct-79
	President's Commission The Need for Change The Legacy of TMI		Kemeny, John G. Chairman	TK 1345.H37 U54	Oct-79
	Radiation and Health Effects A Report of the TMI-2 Accident and Related Health Studies		General Public Utilities Nuclear Corporation		1996
	Report of the Governor's Commission on Three Mile Island		Scranton, William W. Chairman	TK 1345.H37 P46x	2/26/1980
	The Dickinsonian				1979
	The Patriot				1979
	The Sentinel				1979
	The TMI-2 Chronicle The History and Lessons of Three Mile Island Unit Two		General Public Utilities Nuclear		1995

	The TMI-2 Story		General Public Utilities Nuclear		1979-5-25
	The TMI-2 Story Challenge, Change, Conclusion		General Public Utilities Nuclear		1988
	Three Mile Island A Report to the Commissioners and to the Public Vol.1- II		Rogovin, Mitchell, Director		January 1980
JSTOR	Trust and Its Relationship to Psychological Distress The Case of Three Mile Island		Goldsteen, Raymond L. and Karen Goldsteen, John K. Schorr		Political Psychology, Vol. 13, No. 4 (December 1992), pp. 693-717.
	Some Public Helath Lessons from Three Mile Ilsand A Case Study in Chaos		Macleod, Gordon K.		Ambio, Vol. 10, No. 1 (1981), PP. 18-23.
	Nuclear Liability after Three Mile Island		Wood, William C.		The Journal of Risk and Insurance, Vo. 48, No. 3 (Spetember 1981), pp [redacted]-464.
	The Nuclear Regulatory Commission and the Politics of Regulatory Reform Since Three Mile Island		Temples, James R.		Public Administration Review, Vol. 42, No. 4 (July-August 1982), pp. 355-362.
	Some Social and Political Dimensions of Nuclear Power Examples from Three Mile Island		Kelkin, Dorothy		The American Political Science Review, Vol. 75, NO. 1 (March 1981), pp. 132-142.
	Resource Mobilization and Citizen Protest in Communities around Three Mile Island		Walsh, Edward J.		Social Problems, Vol. 29, No. 1 (October 1981), pp. 1-21.
	The Effects of Social Support on Nuclear Worker Responses to the Three Mile Island Accident		Chisholm, Rupert F. and Stanislav V. Kasl, Lloyed Mueller		Journal of Occupational Behaviour, Vol. 7 No. 3 (July 1986), pp. 179-793.
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	Differential Paths to Policital Activisim Comparisons of Four Mobilization Processes after the Three Mile Island Accident		Cable, Sherry, and Edward J. Walsh, Rex H. Warland		Social Forces, Vol. 66 No. 4 (June 1988), pp. 951-969.
	Mortality amoung the Residents of the Three Mile Island Accident Area 1979-1992		Talbott, Evelyn O. and Ada O. Youk, Kathleen P. McHugh, Jeffrey D. Shire, Aimin Zhang, Brian P. Murphy, Richard A. Engbert		Environmental Health Perspectives, Vol. 108, No. 6 (Jun., 2000), pp. 545-552
	The Nature and Predictors of Job Related Tension in a Crisis Situation Reactions of Nuclear Workers to the Three Mile Island Accident		Chisholm, Rupert F. and Stanislav V. Kasl, Brenda Eskenazi		*The Academy of Management Journal*, Vol. 26, No. 3 (Sep., 1983), pp. 385-405

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	Carter Nuclear Licensing Reform versus Three Mile Island		Sylves, Richard T.		*Publius*, Vol. 10, No. 1, The State of American Federalism, 1979 (Winter, 1980), pp. 69-79
Penn State Unversity	Three Mile Island (TMI-2) Recovery and Decontamination Collection	large collection of videos			http //www.libraries.psu.edu/tmi/
Museum Exhibits	Smithsonian National Museum of American History				http //americanhistory.si.edu/tmi/index.htm

Pennsylvania State Historic Preservation Office
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION

October 26, 2020

Gerry van Noordennen
Senior Vice President, Regulatory Affairs
Energy*Solutions*
209 South Main Street, Suite 1700
Salt Lake City Utah 84111

Kim Anthony cmanthony@energysolutions.com

Dear Mr. van Noordennen,

The PA SHPO is in receipt of your letter requesting information on historic and archaeological resources on Three Mile Island. As Three Mile Island Nuclear Station Unit 2 was permanently shut down after experiencing a partial melt down in 1979, after 28 years, the owners have decided to sell the property. In preparation, a Post-Shutdown Decommissioning Activities Report (PSDAR) is required to be submitted to the U.S. Nuclear Regulatory Commission (NRC) for review. While this NRC review does not constitute a federal action that would trigger Section 106 of the National Historic Preservation Act (NHPA), *Energy Solutions* is reaching out to the PA SHPO for information regarding historic and/or archaeological resources on the island that should be considered in the PSDAR assessment.

Three Mile Island is located in the Susquehanna River in Londonderry Township, Dauphin County, Pennsylvania. The Three Mile Island Nuclear Station site encompasses approximately 440 acres including the Three Mile Island and adjacent islands on the north end, a strip of land on the mainland along the eastern shore of the river and the area on the eastern shore of Shelly Island.

Archaeological Resources

In spite of the development of the nuclear facility operations in the middle-north portion of the island, and some significant ground disturbance from borrow facilities elsewhere on the property, there are still some significant and potentially significant archaeological resources remaining. A total of ten archaeological site numbers have been assigned on Three Mile Island. Sites on the island are listed below with brief comments. Additional details are available in *Three Mile Island Generating Station Unit 1 Cultural Resources Protection Plan* dated 12/13/2011 which includes background research and results of on-the-ground reconnaissance by consultants Heberling Associates in 2009.

From north to south, the sites are as follows:

36DA50: Excavations at this site near the northern tip of the island, were undertaken in the 1970s by PHMC archaeologists. Herberling Associate's field views suggested that some of the site may remain intact north of the previous plant construction. The site contains remains of pre-contact Native American camp sites and likely has other, deeply buried components.

36DA96: There is little information about this pre-contact camp site which is assumed to have been totally destroyed by plant construction.

36DA97: Again, little information is available but the site is believed to have been destroyed during construction of the plant.

36DA52: This site was recorded based on surface collections made by local informants. Although there is a specific mapped location for this site, the artifacts recorded for it appear to have come from scattered locations across the island.

36DA98: This site was located in the middle of the island and little information is available.

36DA51: Known from local informants, there is scant information about this site other than its location and mention of unspecified organic materials being found.

36DA235: This site contains the extensive above ground ruins of a 19th- and early 20th-century tobacco farm on the wooded southeastern edge of the island. It includes foundations, walls, pits, wells, a silo and other features. Historic records indicate this location was first used in the late 1700s. The site has good integrity and is potentially an important historical archaeological resource.

36DA99: This Native American site is recorded as a long, narrow strip along the southwest edge of the island where artifacts have been found on the eroding banks; however, the location also includes areas excavated inland from the banks in the 1960s and 1970s.

36DA100: As pointed out in the Heberling report, there is a "somewhat arbitrary distinction" among sites 36DA99, 36DA100 and 36DA101. They are continuous along the river bank from 36DA99 south to the tip of the island and extend northward again from the island's southeast tip. Recent excavations due to a regulated fish passage project on the southwest edge of the island determined the site eligible for the National Register of Historic Places, with concurrence by PA SHPO

36DA101: Contiguous with 36DA100, the site was tested by the PHMC in 1967. Both pre-contact and historic components were present. The site is potentially National Register eligible. In 1998, Steven Warfel excavated a 19th-century burial here. A vest buckle and buttons found with the remains suggested a date between 1860 and 1880.The burial was reinterred in a higher location 30 feet northeast of its original location.

This burial was almost certainly associated with the historic tobacco farm, remnants of which are located at site 36DA235 to the north. This site should be considered especially sensitive due to the presence of the pre-contact materials, the reinterred historic burial and the possibility of an unrecorded family cemetery.

Our primary recommendation is to avoid ground disturbances (for example, removal of fill) in the vicinities of sites 36DA99-101 and 36DA235, and other areas that have 1) not been tested 2) not investigated to confirm condition or 3) are not obviously cut and filled or otherwise deeply disturbed. We recommend that your cultural resources consultants provide you with an updated evaluation of the island to include thorough background search, field visits and further consultation with the SHPO. We look forward to working with agencies, consultants, tribes and other consulting parties during the upcoming Section 106 consultation.

Above Ground Resources

One of the first steps involves identifying resources that may be within or historically associated with the property. These resources may already be known or they may be found through a survey of the area.

The known historic resource, *Three Mile Island Unit 2 (TMI-2) Key # 156047*, is eligible for the National Register of Historic Places (NRHP), under Criterion A for its association with events that occurred during March 28, 1979 through April 4, 1979, under Criteria Consideration G and with a boundary of approximately 12.3 acres. Specific buildings, structures and elements were not necessarily mentioned in the Historic Resource Survey Form (HRSF) on file. Therefore,

additional survey or documentation may be needed to better inventory the historic resource. For instance:

- Liberty Lane on the mainland either crosses over or under the NRHP *eligible Pennsylvania Railroad: Main Line (Philadelphia to Harrisburg), Key # 105675.* It appears that there is a railroad branch/spur on the island. Research should be undertaken to determine if it is historically related to the PRR, and/or which entity constructed it and in what time period, and if it would contribute to the PRR or to TMI-2, Key # 156047.

- Three Mile Island Visitors Center – research should be undertaken to determine if it would contribute to TMI-2, Key # 156047, or if it has significance on its own.

In addition, there may be other unknown or unsurveyed properties on the Three Mile Island, for example:

- Red Hill Dam – research should be undertaken to see if the dam was constructed at least 50 years ago and has significance as a property type, or if it is historically related to TMI-2, Key # 156047 or Three Mile Island.

- Three Mile Island, Key # 079154 – when the island was surveyed initially, it was not at least 50 years of age. Does the entire site, as a nuclear power site (not as the site of the event in 1979), have significance as such. This would include Unit #1 as it began operation in 1974, and will reach 50 years of age in the year 2024.

If you need further information concerning archaeological issues please consult Doug McLearen at dmclearen@pa.gov or (717) 772-0925. If you need further information on above ground resources please consult Cheryl Nagle at chnagle@pa.gov or (717) 772-4519.

Sincerely,

Douglas C. McLearen, Chief
Division of Environmental Review